MOSCOW POWER ENGINEERING INSTITUTE

(TECHNICAL UNIVERSITY)

SCIENTIFIC RESEARCHES

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INSTITUTE OF POWER MACHINERY AND MECHANICS (IPMM)

Institute Director

Ph. D. (Techn.), Professor
Sergey A. Serkov
Ph.: (495) 362-7261
Fax: (495) 362-7428
E-mail: ENMIDIR@mpei.ru

Institute Departments and Divisions

IPMM STEAM GENERATOR DESIGN (SGD) DEPARTMENT

Ph.: (495) 362-7600, ph/fax: (495) 362-7901,
E-mail: PGS-all@mpei.ru; PGS@mpei.ru

At SGD Department:
9 teachers,
4 researchers,
3 Ph.D. students.

Head of Department
Dr. Sci. (Techn.),
Professor Pavel V. Roslyakov

Main lines of research

Research Supervisor

- **Development and implementation of the highly efficient environmentally friendly technologies for organic fuels firing**
  Professor Roslyakov P.V., Head of R&D Lab Molchanov V.A.
- **Reliability and operation effectiveness increase for the steam boilers of TPP**
  Professors Dvoinishnikov V.A., Iziumov M.A., Roslyakov P.V., Head of R&D Lab Molchanov V.A.
- **Development of computer-aided-design technologies for the power machinery equipment**
  Professor Iziumov M.A., Associated-Professor Kniazkov V.P.
- **Mathematical modeling of the nitrogen and sulfur oxides, the polycyclic benzene polycarbons process formation at fuel firing in the power engineering equipment**
  Professor Roslyakov P.V.
- **Development of the mathematical models and the software support for the estimation, substantiation and technical decision making at steam boiler design**
  Professors Dvoinishnikov V.A., Iziumov M.A.
- **Development of computer-aided expertise-diagnostic system for the steam boiler and its elements**
  Professor Dvoinishnikov V.A.
- **Development and implementation of continuos monitoring and the regulating systems for TPP harmful pollutants into the environment.**
  Professor Roslyakov P.V.

Agreements, contracts, projects supported by the state budget

- Development of the technology for creation the automated continuos monitoring system of the power engineering objects pollution
- Development of the mathematical modeling methods for the heat-and-mass exchange processes at organic fuel firing
- The set of R&D investigations on the operation processes with reference to the problem of creation of modern power engineering equipment
- Calculation-analytical researches of the operation processes with reference to the unified series of hot-water gaseous-mazout boilers with heat capacity 35, 60, 120, and 200 Gcal/h
- The R&D complex for the substantiation and expertise of the main engineering designing decisions with reference to implementation of waste coupling schemes with gas-turbine unit
- Combined research of the boiler ecology features and development of recommendations to decrease the harmful wastes into atmosphere

- Development of small-toxic modes of fuel burning on TPP power boilers
- Combined testing and the main and auxiliary boiler equipment adjustment on Diagilev co-generation plant

Key publications

- *Novozhilova, L.L.; Roslyakov, P.V.* Research of patterns of the burning product course in TPP smoke bonnets of different configuration (in Russian) // Radio Electronics, Electrical and Power Engineering. Proc. of XIV intern. Conf. of graduate and PhD students, in 3 volumes. MPEI Publishing House, 2008, p. 200—201.
- *Pleshanov, K.A.; Poslyakov, P.V.* Burning of the various fuel types with monitored chemical underburning (in Russian) // Ibidem, p. 203—204.
- *Bryantseva, S.E.; Khalitov, A.A.; Iziumov, M.A.* The hot-water boilers with 140 MW heat-capacity (in Russian) // Radio Electronics, Electrical and Power Engineering. Proc. of XIII intern. Conf. of students, in 3 volumes. MPEI Publishing House, 2007, p. 223—224.
- *Zhuravliov, R.V.; Supranov, V.M.* Comparative analysis of the various approaches to gaseous-tube boilers designing (in Russian) // Ibidem, p. 224—226.
- *Minaev, A.A.; Timirgaliev, D.V.; Supranov, V.M.* The hot-water boilers with 70 and 140 MW heat-power with the circulating boiling bed (in Russian)// Ibidem, p. 227—228.
- *Novozhilova, L.L.; Roslyakov, P,V.* Numerical research of velocity and concentration field distribution for the burning products in the TPP chimney hole (in Russian) // Ibidem, p. 228—230.
- *Pleshanov, K.A.; Supranov, V.M.* The steam boiler E-160-1,4-250F (in Russian) // Ibidem, p. 232—233.
- *Poslyakov, P.V.* Check and monitoring of the TPP harmful pollution into an atmosphere. Industry ecology (in Russian) // Eneregetika. 2007. No 2 (7). P. 11—15.
- *Iziumov, M.A.; Supranov, V.M.; Roslyakov, P.V.; Novikov, L.V.* Feasibility investigation of the TP-92 boiler transfer at Yavinsk TPP into the non-projective coal types (in Russian) // Teploenergetika. 2008. No 9. P. 7—18.
- *Roslyakov, P.V.; Novozhilova, L.L.; Egorova, L.E.* Arrangement of the harmful emission monitoring from TPP chimneys on the basis of the numerical research (in Russian) / / MPEI Vestnik, 2008. No 4. P. 28—39.
- *Roslyakov, P.V.; Egorova, L.E.; Ionkin, I.L.* Development of the combined automated system for continuous inspection and control of MPEI TPP harmful emission and wastes and for surrounding territory monitoring // Educational medium today and tomorrow (in Russian) / Proc. of All-Russia Conf. Moscow, Oct.2008. MGIU Publisher, 2008. P. 351—354.
- *Roslyakov, P.V.; Novozhilova, L.L.* Investigation of the problem of the continuous monitoring system installation for the TPP chimney harmful emission (in Russian). Problems of heat-and-mass exchange and hydrodynamics in power machinery // Proc. of VI Scientific Seminar of academician Alemasov V.E. Sept. 16th —18th 2008. Kazan: KGU Publisher, 2008. P. 141—144.
- *Roslyakov, P.V.; Novozhilova, L.L.; Ionkin, I.L.* Research of the velocity and concentration field distribution in the swirling TPP chimney flows (in Russian) // Heat-and-mass exchange and hydrodynamics in swirling flows: Proc. of 3rd Intern. Conf. Moscow, MPEI Publishing House, 2008. P. 245—246.
- *Roslyakov, P.V.* Methods of environment protection. Moscow, MPEI Publishing House, 2007. 226 p.

Partners

- «Power Machines» concern, Moscow
- «Power Machinery Alliance», Moscow
- Federal State Enterprise «Opytnoe Konstruktorskoe Buro «Hydropress», Podolsk town. Moscow region.
- «Machinery Plant ZiO-Podolsk», Podolsk town, Moscow region.
- «Podolsk Machinery Plant», Podolsk town, Moscow region.
- «All-Russian heat engineering R&D institute, Moscow
- «Energeticheskiy Institut named after Krzhizhanovskiy, Moscow
- ORGRES Company, Moscow
- «Institut Teploenergoproject», Moscow
- «Mosenergo», Moscow
- «Riazanenergo», Riazan city
- «Tatenergo», Kazan city
- «Chepetskiy mekhanicheskiy zavod», Glazov town

IPMM STEAM AND GAS TURBINES (SGT) DEPARTMENT

Ph./Fax: (495) 362-7739, (495) 362-7675

At STG Department:
19 teachers,
10 researchers,
18 Ph.D. students.

Head of Department
Dr. Sci. (Techn.),
professor Vladimir G. GRIBIN

Main lines of research

Research Supervisor

- **Development and investigation of the steam and gas units of new generation with the super-critical steam parameters**
  Professors Kostiuk A.G., Gribin V.G., Trukhniy A.D.
- **Development of the calculation methods and investigation of the steam and gas units of heat-recovery type**
  Professors Trukhniy A.D., Gribin V.G.
- **Aerodynamic perfection of turbo-machine setting: the blading, the steam-distribution system, inlet, outlet and the transition jets and compactions of the steam and gas turbines of various purposes**
  Professors Zariankin A.E., Gribin V.G.
- **Resource extension and reliability increase of the steam turbines**
  Professors Trukhniy A.D., Kostiuk A.G.
- **Flow computer modeling in the low-pressure cylinder setting of the powerful steam turbines**
  Professors Gribin V.G., Bogomolova T.V.
- **Development and perfection of the new regulating systems and modernization of the existing ACS for steam and gas units**
  Professor Bulkin A.E.

Agreements, contracts, projects supported by the state budget

- Theoretical-calculation and experimental research of the promising power engineering units providing the high efficiency and reliability of the power equipment
- Development of the scientifically reasonable validation of the promising steam unit creation with the super-high steam parameters
- Investigations of consumed and vibration characteristics of the new regulating valves for the steam turbines
- Investigations of the perforated and the lamellar protect grid influence on the effectiveness and reliability of the steam inlet system in the steam turbines
- Experimental investigations and optimization of an outlet jet of the transport gas-turbine unit
- Research and calculation of the promising last stages of the steam turbines
- Investigations of the gas-dynamical elements of high- and medium-pressure setting for increasing the effectiveness of the powerful steam turbine stages
- Research and development of engineering solutions to increase the effectiveness and reliability of the setting elements for the powerful steam turbines
- Combined investigation for creation of the new steam turbine unit generation with the super-high steam parameters
- Development of the system approach adaptation methods to designing the power engineering machines using the modern computer technologies

Key publications

- *Gribin, V.G.; Nitusov, V.V.* Hydro-gas dynamics: Problems-book (in Russian). MPEI Publishing House, 2007. 80 p.
- *Gribin, V.G.* The PGT-450T operated at Kaliningradskaya HEPP—2 // Gas Turbo Technology. 2007. Vol. 1. P. 10—15.
- *Trukhniy, A.D.; Krupennikov, B.N.; Troitskiy, A.N.* The design atlas for the turbine elements. — 3rd edition. (in English and Russian). MPEI Publishing House, 2007. 147 p.
- *Petrunin, B.N.* About a dimension-type choice of the new designs at modernization of over-strip sealing of the steam turbines (in Russian) // MPEI Vestnik. 2007. No 4. P. 14—17.
- *Zariankin, A.E.; Zariankin, V.A.; Arianov, S.V.; Melnikova, A.V.* On a rational form of the regulating valve saddle (in Russian) // Tiazgioloe mashinostrounie. 2007. No 10.
- *New regulating* valve with a pushing rod for the medium-pressure cylinders of the steam turbines / A.E. Zariankin, S.V. Arianov, A.N. Paramonov etc. // Teploenergetika. 2007. No 11. P. 30—36.
- *Zaryankin, A.E.; Zroichikov, N.A.; Arianov, S.V.; Rogalev, A.N.* Turbine of Nuclear Power Plant with outer steam superheater // Power System Engineering, Fluid Flow Pilsen, Czech Republic ES 2007: 6-th Conf. with international participation. P. 229—237.
- *Application* of punched screen in the chamber of the steam turbine regulating stage with a jet steam distribution (in Russian) / A.E. Zariankin, A.N. Paramoniov, S.V. Arianov etc. // Tiazgioloe mashinostrounie. 2007. No 1. P. 10—15.
- *Zariankin, A.E.; Arianov, S.V.; Stirozhuk, S.K.* Steam-gas units with the steam-turbine drive of compressor (in Russian) // Gas-turbine Technologies. 2007. No 7.
- *Zariankin, A.E.; Noskov, V.V.; Arianov, S.V.; Zariankin, V.A.* Mathematical modeling results for a stream in the new locking-regulating valve (in Russian) // Armaturostroenie. 2007. No 4. P. 65—68.
- *Zaryankin, A.E.; Arianov, S.V.; Storojuk, S.K.; Leletko, M.V.* Gas turbine units with a drive of the compressor from an Exfrancous Energy Source // Power System Engineering Thermodynamics Fluid Flow. Department of Power System Engineering, University of Bohemia. Pilsen. Czech Republic. 2008. P. 245—253.
- *Zariankin, A.E.; Chernoshtan, V.I.; Noskov, V.I.; Osetrov, I.A.* High-speed reduction-cooling installation of CKTI products (in Russian) // Armaturostroenie. 2008. No 1 (52). P. 30—35.

Dissertations

- *Fochoryak O.M.* Research and development of methods for operation effectiveness increasing of the power extraction turbines: Cand. Sci. (Techn.) Dissertation. 2007.
- *Tsirkov M.B.* Perfection of the heat-recovery steam-gas turbines due to application of the steam cooling of the gas turbines: Cand. Sci. (Techn.) Dissertation. 2007.
- *Zhen Guanhua.* Calculation-experimental researches of gas-dynamic and a heat efficiency of the high-gap turbine lattices: Cand. Sci. (Techn.) Dissertation. 2008.

Partners

- «Leningradskiy metallicheskiy zavod», Sankt-Peterburg
- «Skoda» company, Czech Republic
- Kaluga Turbine Plant, Kaluga-town
- R&D Enterprize TURBOKON, Kaluga

- Federal State Enterprise «SALUT», Moscow
- Gas-Turbine Technologies, Rybinsk-town

Unique equipment

- The experimental steam and air turbines having no the world's analogues: ET-12, ET-3M, ET-11, OT-1
- Experimental facilities for investigation of a flow in elements of the turbine path, rotating and fixed blade cascades, the control valves, and the exhaust hoods — aerodynamic tunnels BAT, BAT-1, BAT-2, steam-dynamic tunnels KVP-1,2 equipped by the unique optical measuring system (for studying the valves)
- Experimental facilities for investigation of the turbines vibration reliability — a setup for dynamical model of tightening and model of multi-span rotor

IPMM HYDROMECHANICS AND HYDRAULIC MACHINES (HHM) DEPARTMENT

Ph.: (495) 362-7117,
fax: (495) 362-8938,
E-mail: ggm@mpei.ru

At HHM Department:
18 teachers,
2 researchers,
1 Ph.D. student.

Head of Department
Dr. Sci. (Techn.),
Associated-Professor Alexander M. GRIBKOV

Main lines of research

(Research Supervisor)

- **Fundamental research in the field of hydro-gas-dynamics and development of methods for the liquid and gas flow description with increased adequacy to the real processes.**

  Professor Morgunov G.M.;
- **Development of new kinds of the electric-hydraulic drives and their parts for various purposes.**

  Professor Golubev V.I.;
- **Development of the hydro-power installations of increased efficiency and reliability.**

  Professor Morgunov G.M., Associated-Professor Orakhelashvili B.M.;
- **Formation of theoretical bases, research and development of the autonomous electric-hydraulic drives.**

  Associated-Professor Zuev Yu.Yu.;
- **Development of a concept and the applied approach to expert estimation of the hydraulic machines being existed and developed.**

  Associated Professor Zuev Yu.Yu.;
- **Characteristic investigation and creation of the automatics logical schemes on the basis of the fluid technique elements.**

  Associated-Professor Davydov A.I.;
- **Development of the high-reliable equipment for fire- and explosive media.**

  Associated-Professor Ziubin I.A.;
- **Investigation of influence of the pump equipment and the hydraulic system elements operation on TPP main technological cycles function reliability.**

  Associated-Professor Pankratov S.N.

Agreements, contracts, projects supported by the state budget

- Development of the structural — parametric synthesis method for creation of the competitive hydraulic equipment.
- Investigation and design of the hydraulic drives with the regulated hydraulic motors.
- Development of the experimental test facilities for the small hydraulic turbines.

Key publications

- *Morgunov, G.M.* Vane machines for liquids and gases with the increased density of useful energy (in Russian), MPEI Vestnik, 2007, No 6, p. 96—105.

- *Zueva, E.Yu.* Investigation of the hydro and thermo dynamic processes in the hermetic pumps (in Russian), MPEI Vestnik, 2007, No 2, p. 31—41.
- *Chernishov, S.A.; Pankratov, S.N.; Volkov, A.V.* Working parameters improvement of the centrifugal pumps on the basis of a teflon coatings (in Russian), MPEI Vestnik, 2008, No 1, p. 9—13.

Dissertations

- *Zueva, E.Yu.,* Investigation of the hydro and thermal dynamic processes of a viscous liquid flow in the slot channels of the hermetic pumps, Cand. Sci. (Techn.) Dissertation. 2007.
- *Thoj, D.D.,* Analysis and optimisation of hydrodynamic properties of the double-regulated Francis turbine, Cand. Sci. (Techn.) Dissertation. 2007.
- *Chernyshov, S.A.,* Working parameters of the centrifugal pumps improvement on the basis of changed interaction of the solid surfaces with the working liquids, Cand. Sci. (Techn.) Dissertation. 2008.
- *Elzaoor, F.A.,* Analysis of hydrodynamic properties and improvement of the characteristics of the multistage pumps of a very small specific speed, Cand. Sci. (Techn.) Dissertation. 2008.

Partners

- Central R&D institute of automatics and hydraulics, Moscow
- R&D Association «Gidromash», Moscow
- JSC «Rus Hydro», Moscow
- JSC «Mosenergo», Moscow
- «Sigma» company, Czech republic
- «FESTO» company, Germany
- «Company MAGI», Moscow
- «Grundfos» company , Denmark.

Unique equipment

- The efficiency and cavitation test setups for investigation of the hydraulic turbines, the reversible hydraulic machines and the high specific speed pumps.
- A test bench for power and dynamic studies of the hydraulics drive systems and the control units of the high-pressure positive-displacement-rotary pumps.
- A test bench for examining the liquid flow meters and counters.
- A test bench for investigation of the centrifugal pumps with speed regulation.

IPMM BASES OF POWER ENGINEERING MACHINES DESIGN (BPEMD) DEPARTMENT

Ph.: (495) 362-7638;
the fax: (495) 362-7525,
E-mail: OKM-all@mpei.ru;
OKM@mpei.ru

In the BPEMD Department:
14 professors and teachers.

Head of Department
Professor Anatoliy I. SMIRNOV

Main lines of research

Research supervisors

- **The study of design efficiency of the electrical equipment at the dynamic affects**

  Professor Kudryavtsev E.P.
- **Development of the components and the special-purpose units made from the composites and the traditional materials**

  Professor Nikolaev V.P.
- **Research of a strength and reliability of the construction elements made from the composites**

  Professor Nikolaev V.P.
- **The design of equipment for laboratory and scientific studies**

  Professor Nikolaev V.P.
- **Creation of the methods for evaluating the resource of the power engineering equipment elements for variable and steady states of operation**

  Professor Korzh D.D.
- **Development of the methodology of the technical systems design**

  Professor Korzh D.D.
- **Development and creation of the scientific-methodological fundamentals for the training of engineers and designers of the machine-building profile**

  Professor Korzh D.D.

Agreements, contracts, projects supported by the state budget

- The development of the scientific approaches of the creation of the fast systems for the estimations of the power stations equipment reliability according to the monitoring results
- Analysis and research of the structural components of the laboratory educational setups with respect to the machine parts and development of the methodological basis for their conducting with the application of computer technologies
- The development of the laboratory combined equipment namely the CAD class for the lecture course of «Machine the construction fundamentals»
- The development of scientific methodological studies in the field of engineers- designer training for the group of machine-building universities on the basis of the inter-university CAD center
- The development of the general principles of the composite reinforced material application in the power equipment constructions
- The general principles of a construction designing from the composite reinforced materials

- The development of educational support for the students study of the automated design on the basis of the CAD center
- The development of software for design the mechanisms and heat engineering equipment

Key publications

- *Kuznetsov, A.V.; Korzh, D.D.* Software for the solution of the problems of the mechanism synthesis at the stage of design studying in the field of power equipment construction (in Russian) // Proc. of the 13th Intern.conf. of graduate and PhD students. In 3 vol. Moscow: MPEI Publishing house, 2007. Vol. 3, p. 250—251.
- *Korzh, D.D.; Khoroshev, A.N.* Fundamentals of systems approach to the machine design (in Russian) // The bases of design and machine parts — XXI century: Proc. of All-Russia Conf. Oriol-town: Oriol STU, 2007. P. 64—70.
- *Korzh, D.D.; Nikolaev, V.P.; Pichugin, V.S.* Strength and hardness of the reticulated structure elements made from the reinforced composite materials (in Russian) // MPEI Vestnik. 2008. No 3. P. 12—17.
- *Karpov, A.A.; Korzh, D.D.; Shuklin, Yu.A.* Application of the computer technologies at the stage of general technical training of students (in Russian) // News of scientific—methodical commission for machine parts, applied mechanics and design bases of the Ministry of Eeducation and Science of Russian Federation and the Republican seminar «Mechanics» with KBGSKHA. Nalchik: Publishing house of FGOU VPO «Kabardino-Balkarskaya State Academy named after of V.M. Kokov», 2008. P. 16—19.
- *Kudryavtsev, E.P.; Neklepaev, B.N.* Calculation methods of electrical dynamical and thermal action of short-circuit current (in Russian). Section: «The calculation procedure of flexible conductors for the electrical dynamical durability». National standard of RF 352736-2007. 2008.
- *Pichugin, V.S.;Thestnykh, P.P.; Egorov, S.B.* The universal training-software complex on the basis of contemporary technological equipment (in Russian) // Jour. on the metal working «Struzhka». 2008. No 1/2. P. 36—43.
- *Grebenkin, V.Z.; Akulov, R.I.* Analysis of the equation solution for motion of the passive system elements for the inter-operation displacements of the semiconductor plates in article manufacture in electronic industry(in Russian) // «Defense complex to the scientific and technical progress of Russia». 2008. No 4. P. 45—54.
- *Kasyanov, K.G.; Smirnov, A.I.; Shchugorev, V.N.* Defect expansion of the stratification type in the multilayer structural elements (in Russian) // Elektrika. 2008. No 2.
- *Korzh, D.D.; Kuznetsov, A.V.* Synthesis of the machanism optimum structure MPEI Publishing House, 2009. 32 p.

Patents

- *Patent 62238 (RF) for the useful model.* The device for determination of body static moment determination/ A.A. Kochetov, D.D. Korzh // BI. 2007. No 9.
- *Patent 2332650 (RF) for the invention.* The method of determining the body static moment /A.A . Kochetov, D.D. Korzh // BI. 2008. No 24.

Partners

- Federal state unitary enterprise «Coordination-analytical center for the scientific and technical programs of Ministry of Education and Science of Russian Federation» (FGUP «Center MNTP»), Moscow

Unique equipment

- The installation for shaft testing of a reticular structure for twisting
- The set of facilities for sample testing made from composite materials
- The CAD center
- The electronic weights for weighing the long blades of turbo machines.

IPMM THEORETICAL MECHANICS AND MECHATRONICS (TMM) DEPARTMENT

Ph.: (495)362-7719, (495)362-7314;
Fax: (495)362-7719,
E-Mail: kobrin@termech.mpei.ac.ru

On TMM Department:
16 lecturers,
1 researcher,
1 engineer,
9 Ph.D. students.

Head of Department
Dr. Sci. (Phys. and Math.)
Professor Alexander I. KOBRIN

The basic directions of scientific researches

Supervisors

- **Mechatronic control systems using the computer systems of real time**
  Professor Kobrin A.I.
- **Mobile robots and non-holonomic electromechanical systems movement**
  Professor Martynenko Yu.G., Head of Lab Orlov I.V.
- **Dynamics of the sensitive elements of systems for navigation and motion control**
  Professors Martynenko Yu.G., Podalkov V.V., Senior lecturer Merkuryev I.V.
- **Computer modeling of the systems of the connected bodies. Creation of the computer training and supervising software**
  Professor Kirsanov M.N., Senior lecturers Osadchenko N.V., Koretskij A.V.

Contracts, contracts, projects supported by the state budget

- Theoretical and experimental researches of the modes of a controlled auto-rotation ofof a firm body systemDevelopment of new mathematical models for movement of a wave solid-state gyroscope in view of anisotropy of the elastic and dissipative properties of the resonator
- Development of the multi-sensor independent system of space orientation and navigation of new generation for the small space vehicles
- Development of the mathematical models of the new types of gauges of the inertial information for the mobile objects

Key publications

- *Martynenko, Yu.G.; Merkuryev, I.V.; Podalkov V.V.* Non-linear oscillation control for a vibrating ring microgyroscope (in Russian) // Izvestia RAN. Mekhanica tviordogo tela, 2008, No 3, p. 77—89.
- *Martynenko, Yu.G.; Formalskiy, A.M.* About movement of the mobile robot with the "roller bearing" wheels (in Russian). // Izvestia RAN. The theory and control systems, 2007, No 6, p. 5—12
- *Dosaev, M.Z.; Kobrin, A.I., et al.* A constructive theory of the mini-wind-power stations (MWPS) (in Russian). 2007. Part I — 76 p. Part II — 88 p. Lomonosov MSU Publishing House, 2007.
- *Dosaev, M.Z.; Kobrin A.I.; et al.* About feature of functioning of mini-wind-power stations (in Russian) // MPEI Vestnik. MPEI Publishing House. 2007. No 1 p. 71—75

- *Osadchenko, N.V.; Abdelrashman, A.M.* Computer modeling of movement of the mobile creeping robot (in Russian). MPEI Vestnik. MPEI Publishing House. 2008. No 5. p.131—136.
- *Gavrilenko, A.B.; Merkuryev. I.V.* Algorithm of analytical indemnification of the nonlinear drift of a tuning fork type micromechanical gyroscope on the moving basis (in Russian) // Devices and systems. Control, check, diagnostics. 2008. No 5. p. 31—357.
- *Merkuryev, I.V.; Podalkov, V.V.* Influence of a non-linear material elasticity of the ring resonator on dynamics of a micromechanical gyroscope (in Russian) // MPEI Vestnik, MPEI Publishing House. 2008, No 3, p. 5—11
- *Merkuryev, I.V.; Podalkov V.V.* Control of the resonator oscillation amplitude and form of a wave solid-state gyroscope // MPEI Vestnik, MPEI Publishing House. 2008, No 4, p. 5—13.
- *Donnik, A.S.; Merkuryev I.V.; Podalkov, V.V.* Influence of progressive vibration on the basis of dynamics of a wave solid-state gyroscope (in Russian) // Gyroscopy and navigation, 2007, No 1, p. 62—68.
- *Merkuryev, I.V.; Podalkov, V.V.* Influence of non-linear elastic properties of the resonator's material on drift of a wave solid-state gyroscope (in Russian) // Devices and systems. Control, check, diagnostics. 2007, No 7, p. 34—42.
- *Merkuryev, I.V.; Podalkov, V.V.* Tensors in mechanics of a firm and deformable body (in Russian). MPEI Publishing House, 2007, 45 p.
- *Kirsanov, M.N.* Answer book. Theoretical mechanics. Moscow. Publishing House Fizmatlit, 2007, 384 p.
- *Kirsanov, M.N.* Graphs in MAPLE. Moscow. Publishing House Fizmatlit, 2007, 186 p.

Patents

- *Budanov, V.M.; Perov, Yu L.; Sokolov, M.E.; Martynenko, Yu.G.; Suri,; A.V.* Way and the device for an estimation of density and heterogeneity of a biological tissue. The application for the invention № 2005110911 from 4/14/2005. The patent of the Russian Federation for the invention №2299011, BI №14, 2007.

Dissertations

- *Merkuryev, I.V.* Dynamics of the gyroscopic sensitive elements of the orientation and navigation systems for the small space apparatuses // Dr. Sci. (Techn.) Dissertation. 2008.

Partners

- Institute of applied mathematics names after M.V. Keldysh of the Russian Academy of Sciences, Moscow
- Institute of mechanics of the Lomonosov Moscow State University, Moscow
- Moscow Institute of electromechanics and automatics, Moscow
- The Federal State enterprise «Moscow design bureau "Mars", Moscow
- Ramenskoe Device Design Company. Ramenskoe, Moscow Region
- Technological university Velizi, Paris, France
- University Tziotong, Shanghai, Chinese People's Republic
- University Tsinghua, Beijing, Chinese People's Republic
- University of Enschede, The Netherlands
- Federal Centre of science «Electropribor», Saint Petersburg, Russia

The unique equipment

- The equipment for evaporation of the thin diamond-type films
- The breadboard models of the mobile robots created according to the rules of the international scientific and technical festival «Mobile robots»
- The handle for display of efforts at computer modeling (a virtual reality)
- The software package «Universal Mechanism» for modeling dynamics of the complex systems of the connected bodies
- A Strapdawn asimus and vertical device for research of modes of an initial exhibition and navigation
- The research bench for the dynamic and accuracy characteristics of a dynamically tuning gyroscope
- The research bench for processes of information transfer and reception in the multiprocessing and multitask systems of a real time

IPMM DYNAMICS AND STRENGTH OF THE MACHINES NAMED AFTER V.V. BOLOTIN (DSM) DEPARTMENT

Tel/fax: (495) 362-7700,
e-mail: ChirkovVP@mpei.ru

On DSM Department:
24 lecturers,
10 Ph.D. students

Head of Department
Dr. Sci. (Techn.),
Professor Victor P. CHIRKOV

The basic directions of scientific researches

Research supervisors

- **Fracture mechanics**
  Associates-Professor G.Kh. Murzakhanov
- **Stochastic dynamics and safety of the machines and structures**
  Professor V.P. Chirkov
- **Dynamics and stability of the structures**
  Professor V.P. Radin

Contracts, contracts, projects supported by the state budget

- Analysis of a dynamical behavior of structures under the seismic actions
- Study of the stability and a post-critical behavior of the deformable systems under substantially non-potential loading
- Development of the methods of a damage analysis and safety assessment of the structural elements of the power-machine equipment in aggressive environment
- Development of assessment methods of the structures and machine reliability operating under the static and dynamic actions
- Reliability assessment of the gas pipeline systems operating in the complex climatic and geological conditions
- Development of the methodology of the operability and residual resource assessment of the steel cables using the results of diagnostic control.
- Dynamics of the non-linear multi-mass systems under impact and vibrating loads

Main publications

- *Trifonov, O.V.; Chirkov, V.P.; Zakharkin, A.V.* The reduction of damage of high-rise buildings under the strong dynamic actions by means of a stiffness optimization (in Russian) // Stroitelnaya mekhanika i raschet sooruzheniy (Structural mechanics and design). 2007. No 4. P. 59—65.
- *Okopny, Yu.A.; Radin, V.P.; Chirkov, V.P.; Vasina, V.N.* Stability research of a console rod under the parametric loading by the conservative and following loads (in Russian) // Engineering Journal. 2008. No 9. P. 28—33.
- *Trifonov, O.V.; Chirkov, V.P.* Analysis of the safety and failure modes of structures under the multi-component dynamical actions (in Russian) // Stroitelnaya mekhanika i raschet sooruzheniy (Structural mechanics and design). 2008. No 6. P. 38—46.
- *Vasina, V.N.* Parametric vibrations of a pipeline section with a fluid // MPEI Vestnik. MPEI Publishing House. 2007. No 1. P. 5—10.
- Vorontsov, A.; Volokhovsky, V.; Morin, Y. Assessment of working capacity of steel
- ropes using magnetic NDT data // Proceedings of the 17th Intern. Conf. on Durability
- of Steel Ropes and Steel Rubber Conveyor Belts. Kosice. 2008. P. 234—242.

Dissertations

- *Golubeva, O.V.* Application of the statistical modeling in assessment of reliability of the power machine equipment. Cand. of Sci. (Techn.) Dissertation. 2008.
- *Vasina, V.N.* Analysis of the parametric vibrations of machines and structures under the non-conservative loading. Cand. of Sci. (Techn.) Dissertation. 2008.

Partnership

- The Russian foundation for fundamental research (RFBR)
- The Russian academy of architectural and structural sciences
- The Institute of Machine Science of the Russian Academy of Sciences named after A.A. Blagonravov
- The Russian R&D Institute of natural gas and gas technologies (VNIIGAZ)
- R&D institute of power machines named after N.A. Dolezhal', Moscow
- JSC «Techsoft», Moscow
- JSC «Diatex», Volgograd
- JSC «Intron-Plus», Moscow

IPMM METALS TECHNOLOGY (MT) DEPARTMENT

Ph.: (495) 362-7447, (495) 362-7969,
(495) 362-7568, 362-7118, fax: (495) 362-8938;
E-mail: techmet@mpei.ru

At MT Department:
16 lecturers,
1 Candidate to Dr.Sci. degree
8 Ph.D students

Head of Department
Dr. Sci. (Techn.),
Professor Victor K. DRAGUNOV

Main lines of research

Research Supervisor

- **Development of the precision technology complex of the electron-beam welding of the heterogeneous materials**

  Professor Dragunov V.K.
- **Development of technology of the electron-beam welding of the large thickness samples**

  Professor Dragunov V.K.
- **Express-diagnostic method development of the structural-mechanical metal state for the industrial equipment**

  Professor Matiunin V.M.
- **Automated instrument creation for the non-specimen testing of metal physical-mechanical features**

  Professor Matiunin V.M.
- **Technologies for the permanent connection obtaining with the sharply different linear thermal expansion factors and the temperatures of a phase transformation by means of an electron-beam technology**

  Associated-Professor Khokhlovskiy A.C.
- **Development and perfection of the rolling technology and instrument calibration for a hot-rolled pipes manufacture**

  Professor Golubchik R.M.
- **Electron-beam welding technologies of the thin-wall articles from the non-ferrous metals**

  Associated-Professor Goncharov A.L.

Agreements, contracts, projects supported by the state budget

- The project "Development, manufacturing and delivery of a laboratory installation for the cathode diffusive welding"
- Development of research methods for the thermal-electric electromagnetic effect studying at an electron-beam welding of the heterogeneous materials
- Technology development of the electronic-beam welding of the protected module parts made from an austenitic steel with reference to production of a blanket module unit
- Development of the control methods of a technological process of the electronic-beam welding of metal articles of large thickness
- Investigations of a process for welded connection formation for the articles of large thickness and development of the electron-beam welding technologies of a blanket module unit made from 316 L (N) steel
- Complex investigations of the structure and properties of the welded connections of a protective blanket module executed by the electron-beam welding
- Research of an electron-beam welding process of the protective blanket module caps

- Research of the plasma phenomena at interaction of an electron beam with the magnetized target
- Investigation of a structural-mechanical state of the metal construction for the pipe lines of a heating main after the lengthy operation

Key publications

- *Dragunov, V.K.; Goncharov, A.L,; Ovechnikov, S.A.; Sliva, A.P.* Application peculiarities of the electron-beam welding in production of the combined constructions from the heterogeneous steels (in Russian) // Tyazholoe mashinostroenie. 2008. No 4. P. 15—21.
- *Dragunov, V.K.; Goncharov, A.L,; Sliva, A.P.* Variation of the spatial parameters of an electron beam during the interaction with a magnetized target (in Russian) //. Svarochnoe proizvodstvo. 2008. No 12. P. 20—24.
- *Matiunin, V.M.* The critical loads and the image parameters at the initial stage of a plastic ball contact with a plain metal surface (in Russian) // Zavodskaya laboratoria. 2007. No 4. P. 62—65.
- *Matiunin, V.M.; Al'mov, M.I.; Yuzikov, B.A.* Application of an indentation method for determination of a structure homogeneity and the mechanical compact properties made from a nickel nano-powder (in Russian) // Russian nano-technologies. 2007. No 9—10. P. 88—92.
- *Matiunin, V.M.; Demidov, A.N.; Prokhodtsov, M.A.; Yuzikov, B.A.* Scale factor influence upon the determination results of a material hardness by the Brinnel method (in Russian) // Tekhnologia metallov. 2008. No 8. P. 49—52.
- *Cyclic* form-variation parameters at broaching in PNTZ mills (in Russian) / R.M. Golubchik; D.V. Merkulov, E.D. Klempert etc. // Chiornaya metallurgia. 2008. No 12. P. 47—50.
- *Merkulov, D.V.* Roller calibration influence upon the parameters of a flattening process in the rotary piercer mills (in Russian) // Metallurgicheskaya i gornorudnaya promyshlennost. 2008. No 4. P. 47—50.
- *Merkulov, D.V.* Peculiarities of the pipe flatenning without a directed instrument (in Russian) // Stal. 2008. No 7. P. 85—88.

Dissertations

- *Dragunov, V.K.* The electron-beam welding of the heterogeneous steels and allows in manufacture of the combined constructions: Dr. Sci. (Techn.) Dissertation. 2007.
- *Novikov, M.V.* Research of form-formations for the improvements of the deformation modes and a sorting possibility extension of the screw rolling mills and directed instrument: Cand. Sci. (Techn.) Dissertation. 2008.

Partners

- Bauman Moscow State Technical University
- JSC «NPO Energomash» (Khimki)
- JSC Fakel, Khimki
- High Technical School of Konstanz, Germany
- Institute of the electrical welding named by E.O. Paton (Kiev, Ukraine)
- Technical University of Budapest, Hungary
- Physical-technical institute (Minsk, Republic Belarus)
- Blagonravov Institute of machines (RAS, Moscow)
- State Center of science «Research-and-production association on the mechanical engineering technology» (Research-and-production center «TSNIITMASH», Moscow)

- JSC «Aeroelectromash» (Moscow)
- Moscow Association of the main welders
- Federal State Enterprise «Dollegal R&D institute, Moscow

Unique equipment

- Electron beam plant «Langepen» for the metals' welding (electrical power is 45 kilowatt);
- Multipurpose testing machine «Instron» for the mechanical tests of materials with a control program;
- Stationary and portable devices for non-destructive rapid assessment of the physical-mechanical properties of the structural materials;
- Equipment for the automatic, semi-automatic, manual and contact welding

IPMM ENGINEERING DRAWING (ED) DEPARTMENT

Ph.: (495) 362-7219

At ED Department:
35 teachers.

Head of Department
Associated-Professor
Elena P. KASATKINA

Main lines of research

Research Supervisor

- **Developing of the multimedia approaches for teaching of engineering drawing.**

  Associated-Professor Kasatkina E.P.

- **Developing the algorithms of dimension representation in engineering drawings**

  Professor Gornov A.O.

Key publication

- *Gornov, A.O.* On the problem of content improvement for «Engineering drawing» academic discipline (in Russian) // Proc. of Intern. Conf. «Information means and technologies», 2007, October, 16—18. «Information technologies in engineering and economic education». Moscow, MPEI Publishing House, 2007, vol. 1, p. 190—193.
- *Gornov, A.O.* Designing, constructing and their elements in engineering drawing (in Russian) // Ibidem, p. 194—197.
- *Kasatkina, E.P.; Kaurkin, V.P.; Stepanov, Yu.V.* Conceptual possibilities of 3D education application in engineering drawing academic discipline in technical university (in Russian) // Ibilem, p. 206—212.
- *Golovina, L.G.* AutoCAD in educational process (in Russian) // Proc. of Intern. Conf. «Information means and technologies», 2008, October, 21-23. «Information technologies in engineering and economic education». Moscow, MPEI Publishing House, 2008, vol. 1, p. 190—193.
- *Gornov, A.G.; Gubarev, A.Yu.; Zakharova, L.V* Bases for algorithm of dimension presentation in the drawings // Ibidem, p. 206—213.
- *Kasatkina, E.P.; Stepanov, Yu.V.* Practice of multimedia technologies application in «Descriptive Geometry» and «Engineering Drawing» training // Ibidem, p. 214—217.
- *Stepanov, Yu.V., Kaurkin, V.N.* About application of novel computer means for operation with standard items in traditional and remote education // Ibidem, p. 235—238.

IPMM RESEARC & DEVELOPMENT ACADEMIC CENTER OF GEOTHERMAL ENERGETIC (GTE)

Ph./fax: (495) 673-5619

At GTE Center:
4 researcher,
4 engineers and technicians.

Director
Ph.D. (Techn.),
Senior Researcher
Winner of RF State Award
Valery N. SEMIONOV

Main lines of research

Research Supervisor

- **Development of the laboratory and natural experimental benches, installations, devices, and a fundamental investigation fulfillment in area of an education and the multi-phase and multi-component media flows**
  Senior researcher Semionov V.N.
- **Development and equipment creation for the ecologically pure geothermal power plants**
  Senior researchers Semionov V.N., Tomarov G.V.
- **Fundamental researches of the multi-phase geothermal media flows in the elements of the geothermal power plant equipment**
  Senior researcher Semionov V.N.
- **Investigation of the physical-chemical processes of an erosion-corrosion in the two-phase and multi-component media and a metal choice substantiation for the equipment of a geo-power plant**
  Senior researcher Tomarov G.V.
- **Development of the protection methods for the TPP and geoPP equipment against the corrosion. erosion and scales**
  Senior researchers Semionov V.N., Tomarov G.V.

Agreements, contracts, projects supported by the state budget

- Development of the arranging solutions on a combined power unit of the combined GEO-PP
- Geothermal deposit characteristics investigations in Krasnodar region and development the recommendations on its usage in the geothermal energy supplying systems
- Scientific and engineering support of a technical documentation preparation for the geothermal heat supply of Rozovyi village
- Development of the engineering solutions on a geothermal installation with the low-boiling working medium

Key publications

- *Tomarov, G.V.; Shipkov, A.A.; Semionov, V.N.; Kasimovskiy, M.V.* Effectiveness increase of the operation checking of the main metal state of the NPP equipment and pipelines (in Russian) // Tyazholoe mashinostroenie. 2007. No 1.
- *Petrova, T.I.; Kashinsky, V.I.; Semenov, V.N.* Effect of Heat Flux on Deposition Rate of Iron Corrosion Products in Boiler Tubes // Power Plant Chemistry. 2007. № 7.
- *Results* of the ODA-hydrasin mode introduction in the NPP secondary coolant circuit with VVER-440 / Filippov, G.A.; Kukushkin, A.N.; Tomarov, G.V., at al. // Energosberezhenie i vodopodgotovka. 2007. No. 3 (47).

- *Growth* of the operational erosion-corrosion durability of the pipe system forming elements for a low-pressure evaporator of the recovery-boiler of the combined turbine unit (in Russian) // G.V. Tomarov, Yu.V. Petrov, V.N. Semionov et al. // Teploenergetika. 2008. No 2. P. 56—61.
- *Heat* flow influence upon the formation velocity of the iron and copper corrosion product deposits in the boilers (in Russian) / T.I. Petrova, V.I. Kashinskiy, V.N. Semionov et al. // Teploenergetika. 2008. No 7. P. 2—5.
- *Tomarov, G.V.; Shipkov, G.V.* The matrix of the hydrodynamic coefficients and the erosion-corrosion area zones in the NPP and TPP elements // Energosberezhenie i vodopodgotovka. 200. No. 3 (53).
- *Butuzov, V.A.; Tomarov, G.V.; Бутузов В.А., Shetov, B.Kh.* Geothermal heat-supply system using the solar energy and the heat pumps // Promyshlennaya teploenergetika. 2008. No 9.

Patents

- *Patent 72698 (RF).* System for corrosion protection of the TPP equipment / V.N . Semionov, G.V. Tomarov, S.A. Popov, I.G. Mezhikovskiy // BI. 2008. No 12.

Partners

- JSC RusHydro, Moscow
- Federal Agency on science and innovations of Russian Federation, Moscow
- Energy conservation and new technologies center of Krasnodar region, Krasnodar city
- S.S. Kutateladze Institute of thermal physics, Syberian Branch of Russian Academy of Sciences, Novosibirsk
- JSC Geoterm-EM, Moscow
- JSC GeoInkom, Moscow

Unique equipment

- Large-scale experimental units (steam turbines, separators, heat exchangers) exceeding the best world models
- Field experimental installations for the studying processes of an erosion-corrosion deterioration of the construction metals in the GeoPP working environments
- Laser testers for measuring a size of the moisture drops and sensors for determining the characteristics of the liquid skins
- Special instruments, tools and measurement systems with which the experimental plants and field stands are equipped and systems of the experiment automated control having no world analogues

INSTITUTE OF THERMAL AND NUCLEAR POWER ENGINEERING (ITNPE)

Institute Director

Dr. Sci. (Techn.) Professor
Honored worker of higher education of RF
Aleksaner T. KOMOV
Ph.: (495) 362-7205
Ph/Fax: (495) 362-7291; (495) 673-3481
E-mail: ITTFDIR-all@mpei. ru

Institute Departments

ITNPE WATER AND FUEL TECHNOLOGIES (WFT) DEPARTMENT

Ph.: (495) 362-7608, fax: (495) 362-7171
E-mail: postman@twt.mpei.ac.ru

At WFT Department:
13 teachers,
20 researchers,
9 engineers and technicians,
11 Ph.D.-students.

Head of Department
Dr. Sci. (Techn.), Professor,
Winner of RF President and RF Government Award,
Academician of International Academy of
Higher Educational Institution
Victor N. VORONOV

■ Main lines of research

Research Supervisor

- **The water-chemical regimes on the TPP and NPP**
  Professor Petrova T.I.
- **Water preparation on the TPP and the high-mineralized foul water processing**
  Leading Researcher Vasina L.G.
- **Mathematical modeling of the chemical-technological processes**
  Professor Voronov V.N.
- **Personal computer software complexes development for the personnel training and qualification raising of the chemical workshops in the TPP and NPP**
  Professor Ochkov V.F.
- **Personal computer software complexes development for the personnel training and qualification raising of the personnel of organizations exploited the heat networks**
  Professor Ochkov V.F.
- **Development of the academic-methodical complexes in the «Thermal Power Engineering» direction**
  Professor Ochkov V.F.
- **Monitoring and automatic of the chemical control systems in the TPP and NPP**
  Ph.D. Smetanin D.S
- **Fuel and technological problems**
  Associated-Professor Bugrov V.P.
- **Water-chemical regimes of the heat networks**
  Senior Researcher Boglovskiy A.V.

■ Agreements, contracts, projects supported by the state budget

- Temperature influence investigations on an admixture behavior in conformity with the TPP operation conditions in a helamine presence
- Helamine influence investigations on the steel corrosion in the liquid films in the steam turbines phase transition zone
- Experimental investigation of the alloyed steel corrosion speed in the water at temperatures 300...350 °C

- Phosphate distribution checking in the water-steam section of the HEPP-22 TP-87 boiler with purpose of its dispensing improvement
- Analytical review of publication information concerning the admixtures behavior in the reactor installation sections
- Sulphate mass transfer factors studying between the boiling water and the saturated steam with purpose of mathematical model creation of a sulphates distribution in two-phase zone
- Technological algorithms development for the informational support in the systems of a water-chemical regimes monitoring and control in the TPP
- Participation in 8th Conference on analysis and implementation of the engineering systems (ESDA 2006)
- Regulation development for a pollutant solution treatment for the water-chemical regime fulfillment of a system of monitoring and control testing in the NPP second contour with WWER at B-3 bench
- Development of materials for the chemical-technological monitoring system design for the water-chemical mode of the Sredneural TPP
- Development and optimization of the water-chemical regimes of the evaporator installations
- Optimization of the water-chemical regimes of the heat networks
- Simulator development for the TPP water-chemical regime control for the once-through boilers
- PC software development for the initial data acquisition and analysis on the working place of the chemical department chief.
- Calculation software development for the thermophysical properties of the air — water — water steam — ice system under the high pressure and temperature with account of the real component properties

Key publications

- ***Simulator*** for the personnel training for the heat networks (in Russian) / V.F. Ochkov; S.V. Mischeryakov; K.A. Orlov // Novels in Russian power engineering. 2007. No 1.
- ***Aleksandrov, A.A,; Ochkov, V.F.; Orlov, K.A.; Ochkov, A.V.*** Thermal-physical properties of a water and a water steam in Internet (in Russian) // Promyshlennaya Energetika. 2007. No 2. P. 29—35.
- ***Ochkov, V.F., Aleksandrov,A.A., Orlov, K.A.*** Thermal-dynamic cycles: calculations in Internet (in Russian) // MPEI Vestnik. 2007. No 1. P. 43—45.
- ***Ochkov, V.F.*** Creation of «Electronic Encyclopedia of Power Engineering» — information contribution to industrial and educational processes (in Russian) // Teploenergetika. 2007. No 7. P. 10—14.
- ***About*** MPEI cooperation with JSC Mosenergo (in Russian) / V.F. Ochkov, T.I. Petrova, A.P, Rykov et al. // Elektricheskie stantsii. 2007. No 11.
- ***Ochkov, V.F.; Aleksandrov, A.A.; Orlov, K.A., Ochkov, A.V.*** Properties of the heat-carriers and the working media in energetic: information in Internet (in Russian) // |Novels in Russian power engineering. 2008. No 1. P.
- ***Menshikova, V.L.; Moryganova, Yu.A.; Ochkov, V.F.*** Photometry (in Russian). Moscow. MPEI Publishing house, 2008.
- ***Simulator*** for training the personnel of the heat networks / V.F. Ochkov, S.V. Mischerykov, K.V. Orlov et al. // Novosti teplosnabzhenia. 2008. No 4 (92).

- *Korobov, V.I.; Ochkov, V.F.* Complex of the computation documents on a chemical kinetics with the help of the Mathcad Calculation Server (in Russian) // Proc. of 1st conf. «Computation modeling in chemistry and technologies». Cherkassy, Ukraine. 2008.
- *Kopylov, A.C.; Ochkov, V.F.* Informational and computation support for the advanced water-treatment technologies (in Russian) // Vodoochistka. Vodopodgotovka. Vodosnabzhenie. 2008. No 3. P. 41—45.
- *Ochkov V., Alexandrov A., Orlov K., Ochkov A.* Thermodynamic Cycles: Calculations on the Internet // Proc. of the 7-th Conf. «Power System Engineering, Thermodynamics & Fluid Flow», June 26—27, 2008, Pilsen, Czech Republic.
- *Aleksandrov, A.A.; Petrova, N.I.; Ochkov, V.CF.; Smetanin, D.S.* Annual scientific session of MASVP (in Russian) // Teploenergetika. 2008. No 7. P. 77—78.
- *Ochkov, V.F.* Information Internet-resources for thermal power engineering experts (in Russian) // Energetik. 2008. No 8.
- *Alexandrov A., Ochkov V., Orlov K.* Steam Tables and Diagrams on Mathcad Calculation Server for Personal Computers, Pocket Computers and Smart Phones // Proc. of the 15th Intern. Conf. of the Property of Water and Steam, Berlin/Germany, September 7—11, 2008.
- *Ochkov, V.F.; Yankov, G.G.* Mathematical packets and a problem of knowledge transfer (plenary report) (in Russian) // Proc. of V-th seminar «Heat-and-mass transfer and hydrodynamics problems in power machinery», Sept. 16—18, 2008. Kazan,
- *Ochkov, V.F.; Chudova, Yu.V.* Internet-support of a water-treatment branch (in Russian) // Proc. of IV Intern. Conf. «Water-treatment and water-cleaning — 2008», Oct. 8th, 2008, Moscow.
- *Network* computation of the processes and the cycles of the thermal power engineering installations (in Russian) / V.F. Ochkov, A.A. Aleksandrov, Orlov K.A. et al. // Novels in Russian Electric Power Engineering. 2008. No 10.
- *Internet-version* of the reference-book on Thermal Power Engineering and Heat Engineering. Instrumental means for creation and development (in Russian) / G.Yu. Kondakova; A.S. Kopylov; K.A. Orlov et al. MPEI Publishing House, 2007. 160 p.
- *Evsiutin, A.V., Boglovskiy, A.V.* Application of an aluminium oxychloride for the water coagulation with a high content of the organic admixtures and a low alkalinity (in Russian) // Teploenergetika. 2007. No 7. P. 67—74.
- *Arrangement* of a water-chemical regime of the thermal water-treatment (in Russian) / V.A. Boglovskiy, V/B/ Chernozubov, N.E. Chernykh et al. // Teploenergetika. 2007. No 7. P. 15—19.
- *Pirogov, G.V.; Serov, V.E.; Boglovskiy, A.V.* Investigation of an acoustic oscillation influence on the process of scale formation (in Russian) // Novels in Russian Electrical Power Engineering. 2008. No 5. P. 34—40.
- *Petrova, T.I., Repin, D.A.* Influence of the film-forming amines upon the speed of a brass corrosion in a cooling water of the turbine condensers (in Russian) // Novels in Russian Electrical Engineering. 2008. No 8.
- *Petrova, T.I.; Isianova, A.R.* Estimation of a various factor influence on the deposit formation speed for the iron corrosion products on the pipe surface of the drum boiler (in Russian) / Proc, of XIV conf. of graduate and Ph.D. students. In 3 volumes. MPEI Publishing House, 2008. Vol. 3. P. 128—129.
- *Petrova, T.I., Repin, D.A.* Helamin influence of the speed of a brass corrosion in the reverse cooling systems (in Russian) // Ibidem, P. 136—137.
- *Petrova, T.I.; Selezniov, L.I., Isianova, A.R.* Deposit formation of the iron corrosion products on the heat-transfer surfaces of the drum boilers (in Russian) // MPEI Vestnik. 2008. No 6. P. 146—150.

- *Petrova T.I.; Kashinsky V.I.; Isyanova A.R.; Barry R.* Dooley Effect of Water Chemistry on deposition Rate of Iron Corrosion Product in Boiler Tubes // Proc. ICPWS XV, Berlin, September 8—11, 2008.
- *Petrova T.I.; Nikolaev P.A.* Behavior of aluminium corrosion products in water-steam cycle of power plant. Proc. ICPWS XV, Berlin, September 8—11, 2008.
- *Egoshina, O.V.; Voronov, V.N.; Nazarenko, P.N .* Development of an automatic control of the hydrazin batching in CXTM (in Russian) // Teploenergetika. 2007. No 7. P. 25—27.
- *Egoshina, O.V.; Voronov, V.N.* Mathematical models of an impurity distribution over the power unit path for the chemical-technology monitoring systems (in Russian) // Novels in Russian Electrical Power Engineering // 2008. No 10.
- *Gotovtsev, P.M.; Smetanin, D.C.* Analysis of a heat-carrier condition with the help of the artificial neuron networks (in Russian) // Teploenergetika. 2008. No 7. P. 15—20.
- *Smetanin D.S.* Operation optimization of the chemical-technology monitoring systems with the help of the technological algorithms (in Russian) // Teploenergetika. 2007. No 7. P. 20—24.
- *Voronov, V.N.; Gotovtsev, P.M.; Smetanin D.S.* Construction of a testing complex of the water-technology regime diagnostic methods on the basis of the monitoring system for an experimental bench (in Russian) // Teploenergetika. 2007. No 7. P. 2—5.

Dissertations

- *Egoshina, O.V.* Development of an automatic batching system of the correcting reagents and the analysis of the water-chemical transients on the TPP: Cand. Sci. (Techn.) Dissertation. 2008.
- *Gotovtsev, P.M.* Perfection of the power plant's water-chemical regimes with the help of the technological algorithms and the software applied packet for the chemical-technology monitoring: Cand. Sci. (Techn.) Dissertation. 2008.
- *Pirogov, G.V.* Research of the combined chemical and acoustic methods for the scale formation restriction in the heat-exchange equipment of the TPP and the boiler-houses: Cand. Sci. (Techn.) Dissertation. 2008.

Partners

- JSC Mosenergo, Moscow
- JSC INVEl, Moscow
- State Unitary Enterprise "All-Russia Research Institute of Nuclear Power Engineering" (VNIIAM), Moscow
- JSC All-Russia Thermal Engineering Institute (VTI), Moscow
- Electric Power Research Institute (EPRI), Palo-Alto, California, USA
- Oak Ridge National Laboratory, Oak Ridge, TN, USA
- JSC Kaluga Turbine Works (KTZ), Kaluga
- Russian Scientific Center "The Kurchatov Institute", Moscow
- JSC Power Plants Maintenance (ORGRES), Moscow
- Co-generation power plants HEPP-21, 22, 23, 25, 28, GRES-4 of JSC "Mosenergo", Moscow
- Aleksin Co-generation Power Plant of JSC "Tulenergo", Aleksin
- Pervomaiskaya Co-generation Power Plant of JSC "Tulenergo", Pervomaisk
- JSC "Tverйnergo", Tver'
- Central Boiler-Turbime Institute (TsKTI), St.-Petersburg

- State Unitary Enterprise "All-Russia Institute for Nuclear Plant Research" (VNIIAES), Moscow
- State Unitary Enterprise "Karpov's Physical-Technical Institute" (GUP NIFTI), Moscow
- Federal State Unitary Enterprise "Dolezhal's Electro-Technical Research and Construction Institute" (FGUP NIKIET), Moscow
- Electrogorsk Research Center on Nuclear Plants Safety (ENITs), Elektrogorsk, Moscow region
- R&D Center «Element», Moscow
- Sverdlovsk R&D institute of chemical machinery, Ekaterinburg
- «TRIERU» company, Moscow

Unique equipment

- Analyzers for determination of the micro concentrations of the water impurities:
- Ion-chromatograph of Shimadzu Co.
- Atomic-absorption spectrometer of Shimadzu Co
- Analyzer of general organic carbon of Shimadzu Co
- Sodium analyzer (Orion, USA)
- Analyzer of nano-particles Zetasiser Nano of Malvern instruments Ltd,
- Flowmeter of A&D Company Ltd
- Test rig for studies of a corrosion rate, an impurities behavior in water and steam at the operating parameters of the power generating equipment
- Cycle chemistry monitoring system
- Test rig for studies of a deposit formation
- Network calculation server with MathCad Application Server technology
- Experimental bench for introduction of the correcting reagents
- Experimental reverse-osmosis bench for a chemical desalination

ITNPE THERMAL POWER PLANTS (TPP) DEPARTMENT

Ph : (495) 362-7157, fax (495) 362-7990,
E-mail: BurovVD@mpei.ru
Internet site: www-hps.mpei.ac.ru

At TPS Department:
21 teachers,
10 researchers,
11 Ph.D.-students.

Head of Department
Ph. D. (Techn.),
Professor Valery D. BUROV

■ Main lines of research

Research Supervisor

- **Low-wasted technologies of the water-treatment and the foul-water processing on the basis of the thermal chemical desalting method**
  Professor Sedlov A.S.
- **Schemes and equipment development for the thermal water treatment**
  Professor Sedlov A.S.
- **Development of the resource and energy saving technologies on the TPP**
  Professor Sedlov A.S.
- **Development and optimization of the schemes and parameters of a gas turbine and a combined TPP**
  Professor Burov V.D.
- **Investigation of the investment economical efficiency at the TPP development**
  Professor Burov V.D.
- **Investigation of a gas-piston installation application in the power engineering**
  Professor Burov V.D.
- **Combine project expertise of the gas-turbine, gas-piston and combined TPP**
  Professor Burov V.D.
- **Optimization of the TPP operating regimes**
  Associated-Professor Il'in E.T.
- **Development of an automated monitoring method of the operating condition of the TPP equipment**
  Associated-Professor Dorokhov E.V.

■ Agreements, contracts, projects supported by the state budget

- Technical-economical analysis of the schemes of manufacture the makeup water of the heat-network for the TPP «MOEK»
- Investigations of a water-treatment improvement on the basis of the sodium cycle and a solution development of the foul-water problem due to its utilization and treatment in the collecting system of Moscow
- Development of actions for the decreasing the temporary agreed disposals of the zinc and copper compounds till the maximum permissible disposals in the bleed waters of the Mosenergo TPP cooling systems
- Ecology audit of the OGK-3 and the Kostromskaya TPP branch.
- Complex program development for reduction of the water consumption and the water drainage in a power system on a period till 2010 in Mosenergo Company
- Development of a business plan and an estimation of the construction effectiveness of the gas-steam TPP at the Moscow Metallurgy plant SERP I MOLOT

- Research and development of a heat schemes of the Nizhniy Novgorod TPP on the basis of GTE-110
- Development and calculation of the individual specific rate of the polluting substance emission for the TPPs Mosenergo
- Effectiveness analysis of the main directions of an energy saving program for Mosenergo up to 2020
- Development of the technical solutions on an operation effectiveness improvement of installation for the foul water utilization at Kazan HEPP-3
- Development of the detailed technical solutions (underproject) and a technical task on the evaporating installation design for treatment of the bleed waters into a distillate for the drum boilers of the TPP-22 of Mosenergo
- Technical economical estimation of effectiveness of the coal burning at the new power units of 330 MW at the Cherepovetz TPP

Key publications

- *Efficiency* calculation of a hybrid electric power with the high-temperature fuel element (in Russian) / Korovin, N.V.; Sedlov, A.S.; Slavnov, Yu.A,; Burov, V.D. // Teploenergetika. 2007. No 2. P. 49—53.
- *Calculated* indices of turbo-installation's heat scheme with the super-critical parameters and with two intermediate overheating (in Russian) / A.S. Sedlov; E.V. Dorokhov; M.V. Fiodorov // Elektricheskie stantsii. 2007. No 7. P. 11—15.
- *Perfection* of the heat schemes of the multi-stage TPP evaporating installations (in Russian) / A.S. Sedlov, I.P. Panina; A.A. Komov et al. // Elektricheskie stantsii. 2007. No 9. P. 19—25.
- *Heat-hydraulic* operation regimes of the evaporators with natural circulation at the over-critical mineralization of a concentrate (in Russian) / A.S. Sedlov; Yu.A. Kuzma-Kichta; A.S. Kartsev et al. // Teploenergetika. 2007. No 6. P. 27—33.
- *About* the reduction possibility of the pipeline hydraulic resistance of the heat-supply systems (in Russian) / A.S. Sedlov, V.A. Ryzhenkov; A.V. Ryzhenkov // Emergosberezhenie i vodopodgotovka. 2007. No 5 (49). P. 22—27.
- *Sedlov, A.S.; Kuzma-Kichta, Yu.A.* Hydro-dynamics and heat-exchange at the water solution boiling (in Russian). MPEI Publishing House. 2007. 164 p.
- *Terminology* reference-book of the power engineering (in Russian) / A.B. Chubais; E.I. Gavrilov; A.S. Sedlov et al. Moscow.: INVEL Publisher, 2008. 900 p.
- *Application* of the surface-active substances for reduction of the pipeline hydraulic resistance of the heat-supply systems (in Russian) / V.A. Ryzhenkov, A.S. Sedlov, A.V. Ryzhenkov // MPEI Vestnik. 2008. No 1. P. 41—47.

Dissertations

- *Galanskaya, Yu.N.* Technical economical research of an influence of the blade apparatus height on the operation effectiveness of the cogeneration turbine under the operation conditions: Cand. Sci. (Techn.) Dissertation. 2007.
- *Pashenko, Yu.E.* Research and development of a low-waste technology of the water decarbonization and the water hardness removal using the carboxylic cations: Cand. Sci. (Techn.) Dissertation. 2007.
- *Kon'kov, E.O.* Hydrodynamic investigation at the Na2SO4 water solution boiling inside the pipe and a perfection of an evaporator calculation approach: Cand. Sci. (Techn.) Dissertation. 2007.

- *Ryzhenkov, A.V.* Research of the surface-active substance influence on a pipeline hydraulic resistance of the heat-supply systems and development of an energy charge reduction way under a heat-carrier transportation: Cand. Sci. (Techn.) Dissertation. 2008.
- *Anakhov, I.P.* Increase of operation effectiveness of the TPP water-supply reverse systems on the basis of elimination and prevention of the thermal-barrier deposit formation of the condenser pipe surfaces: Cand. Sci. (Techn.) Dissertation. 2008.

Partners

- JSC «MOSENERGO», Moscow
- Mosenergoproekt Design Institute, Moscow
- Moscow United Energy Company, Moscow
- HEPP-8, 22 of «MOSENERGO», Moscow
- Third Generation Company of Whole Market of Electrical Energy, Moscow
- Fifth Generation Company of Whole Market of Electrical Energy, Moscow
- Stuttgart University, Germany
- JSC Saturn-Gas Turbines, Rybinsk
- Generating Company No 6, Nizhniy Novgorod
- LLC «Siemens», Moscow
- CC «MR-Energo-Stroi», Moscow
- PC «Vserossiyskiy teplotehnicheskiy institut» (VTI), Moscow
- Berlin Technical University, Germany
- EMK Engineering Company, Moscow
- Joint Institute of high temperatures RAS, Moscow
- PC TKZ «Krasnyi kotel'schik», Taganrog
- PC «Firma ORGRES», Moscow
- Institute Teploelektroproekt, Moscow
- «Quarz» engineering company, Moscow
- «KO-invest» company, Moscow

AUTOMATED CONTROL SYSTEM FOR THERMAL PROCESSES (ACSTP) DEPARTMENT

Ph.: (495) 362-7029, fax: (495) 362-7720
E-mail: ASUTP-all@mpei.ru, ASUTP@mpei.ru,
Internet site: http://acswww.mpei.ac.ru

At ACSTP Department:
28 teachers,
3 researcher,
246 Ph.D. students.

Head of Department
Dr. Sci. (Techn.),
Professor Alexander V. ANDRIUSHIN

Main lines of research

Research Supervisor

- **Development of the energy strategies for the nearest and medium-term trends**
  Professors Andriushin A.V., Kudriaviy V.V.
- **Realization of the tariffs on the electric power expertise for the power companies**
  Professors A.V. Andryushin, V.V. Kudriaviy
- **Development of the technical re-equipment programs for the power plants**
  Professors Andriushin A.V., Kudriaviy V.V.
- **Development of the creation and modernization conception for the integrated ACS of the power plants on the basis of the modern technical means**
  Professors Arakelyan E.K., Pan'ko M.A.
- **Development of the control system theory for the thermal power engineering and the technological objects control**
  Professor Rotach V.Ya., Associated-Professor Volgin V.V.
- **Investigation, calculation and the metrological feature perfection methods for the primary transducers of a complex structure used in the power engineering**
  Associated-Professor Ivanova G.M.
- **Development of the operation monitoring technological tasks, the technical diagnostic of the main and auxiliary equipment, the ACSTP tasks for the power plants, which are included at the stage of the ACS creation and modernization on the basis of the modern technical means**
  Professor Arakelyan E.K., Associated-Professor Mukhin V.S.
- **Operation regimes optimization of the main and auxiliary equipment of the power plants**
  Professor Arakelyan E.K., Associated-Professor Makarchian V.A.
  Associated-Professor Mezin S.V.
- **Development of fundamentals of the modern computer simulators for the operative personnel of the power plants**
  Professor E.K. Arakelyan, Associated-Professors V.P. Zver'kov,
  V.F. Kuzishin, Senior Lecturer Kuznetcova A.V.
- **Control systems synthesis on the basis of the microprocessor controllers allowing providing the complex controlling rules**
  Professor Rotach V.Ya., Associated-Professors Kuzischin V.F., Zver'kov
- **Development of the universal-purpose software for an efficiency estimation calculation of the power boilers operation on the mixed fuels**
  Associated-Professors Sabanin V.R., Smirnov N.I.

- **Organization and optimization of a repair handle on the power station and in the power system**

  Professors Andryushin A.V., Kudriaviy V.V.
- **Optimization problem solutions in the power engineering under conditions of the initial information uncertainty and inadequacy**

  Professor Arakelyan E.K., Associated-Professor Mezin S.V.
- **Diagnostics of the ACSTP informational sub-systems using the artificial intelligence technologies**

  Associated-Professors Sabanin V.R., Smirnov N.I.

Agreements, contracts, projects supported by the state budget

- Development of a network computer simulator for the TPP operating personnel training
- Development of an operative technique for the electrical load sharing between the power units
- Technique perfection for a heat consumption measurement for a hot water and steam for a wide consumer range
- Algorithms development and software realization for the initial information reliability monitoring at the ACSTP of the TPP and NPP
- Development of the multi-criterion optimization problem solution methods in the power engineering

Key publications

- *Rotach, V.Ya.* The theory of automatic control: whether there correspond its main positions of a reality? (in Russian) // Industrial ACS and controllers. 2007. No. 3.
- *Rotach, V.Ya.* Interval iterative algorithms of the adapting (in Russian) // Automatization in industry. 2007. No. 7.
- *Rotach, V.Ya.* Interval iterative algorithms of the PID-regulators adapting (in Russian) // Automatization in industry. 2007. No. 9.
- *Sabanin, V.R.; Smirnov, N.I.; A.I. Repin, A.I.* Robust adjustment of the double-circuit automatic control systems (in Russian) // Thermal Engineering, 2007. No. 7. P. 52—61.
- *Sabanin, V.R.; Smirnov, N.I.; A.I. Repin, A.I.* About a correctness of the PID-regulator adjustment at approximation of a transient characteristic of the regulation object by an aperiodic link with a transport delay (in Russian) // Industrial ACS and controllers. 2007. No. 1. P. 34—40.
- *Sabanin, V.R.; Smirnov, N.I.; A.I. Repin, A.I.* To a problem on a sensitivity and a robust adjustment of the many-dimensional regulators in the systems of the connected regulation (in Russian) // Industrial ACS and controllers. 2007. No. 7. P. 31—37.
- *Sabanin, V.R.; Smirnov, N.I.; A.I. Repin, A.I. V.R.* Structural implementation and optimal adjustment of the multi-parameter PIDD2-regulator with a real derivation (in Russian) // Industrial ACS and controllers. 2007. No. 11. P. 34—40.
- *Sabanin, V.R.; Smirnov, N.I.; A.I. Repin, A.I.* Sensitivity and a robust adjustment of the PID-regulators with a real derivation (in Russian) // Thermal Engineering, 2007, No. 10. P. 16—24.
- *Kocharovskiy, D.N.; Pikina, G.A.* Efficiency comparison of a prognostic algorithm with maximum speed and the PID-algorithm in the closed system of automatic control (in Russian) // Thermal Engineering, 2007, No. 1. P. 62—68.
- *Pikina, G.A.; Zhuk. T.N.* Convective heat exchanger models with the distributed heat-carrier parameters (in Russian) // MPEI Vestnik, 2007, No.1. P. 38—42.

- *Krokhin, G.D.; Mukhin, V.S.* Simulation of a resource and reliability of the turbo-installation equipment in view of the strategy of its repair. Part 1 (in Russian) // Industrial ACS and controllers. 2007, No. 10.
- *Krokhin, G.D.; Mukhin, V.S.* Simulation of a resource and reliability of the turbo-installation equipment in view of the strategy of its repair. Part 2 (in Russian) // Industrial ACS and controllers. 2007, No. 12.
- *Nevzgodin, V.S.; Radin, Yu.A.; Pan'ko, M.A.* Algorithmic bases of the start-up automation of the combined-cycle plant of high power (in Russian) // Thermal Engineering, 2007, No. 10. P. 46—51.
- *Arakelian, E.K., Tsipuliov, D.Yu.* Optimization of the power station operation with a complex structure of the equipment in conditions of the variable power consumption graphs (in Russian) // Vestnik MPEI, 2007, No. 1. P. 32—37.
- *Arakelian, E.K.; Rubashkin, A.S.* Application prospects of the analytical computer models of the heat-mechanic processes of a power units for rise of a level of designing and maintenance of the TPP (in Russian) // Thermal Engineering, 2007, No. 10. P. 43—45.
- *Arakelian, E.K.; Makarch'yan, V.A.; Tsipuliov, D.Yu.* Methodical positions of an optimum control of the TPP modes with a complex structure of the equipment (in Russian) // Thermal Engineering, 2008, No. 3. P. 67—73.
- *Arakelyan, E.K.;Mezin, S,V,; Magdi, M.R.* Development and adjustment of a fuzzy controller at limitation on a store of stability (in Russian) // Vestnik MPEI, 2008, No.2. P. 13—19.
- *Pikina, G.A.* About choice of a wall model at the heat exchanger dynamic calculation (in Russian) // MPEI Vestnik, 2008, No.1. P. 48—53.
- *Arakelian, E.K.; Matvienko, K.S.* About involvement of the T-250 power unit, working in the sliding mode, in regulation of a frequency and a power in the power system (in Russian) // MPEI Vestnik, 2008, No.1. P. 29—36.
- *Pikina, G.A.* Multipoint models of hydrodynamics of the one-dimensional single-phase stream (in Russian) // Thermal Engineering, 2008, No. 6. P. 62—67.
- *Pan'ko, M.A.; Belov, S.L.* Influence of a transition from an ideal to a real PID-regulator on dynamic accuracy of the system (in Russian) // Thermal Engineering, 2008, No. 6. P. 67—71.

Dissertations

- *Pikina G.A.* Methodological bases of the analytical model construction of the heat power processes, Dr. Sci. (Tech.) Dissertation, 2007.
- *Rubashkin A.S.* Theoretical bases of the all-mode analytical model construction of the heat-mechanic processes and the power units of the TPP control systems, Dr. Sci. (Tech.) Dissertation, 2007.
- *Tsipuliov D.Yu.* Choice of the optimal modes of the TPP operations with a complex structure of the equipment, Cand. Sc. (Tech.) Dissertation, 2008.
- *Bolonov V.O.* Choice of the optimal modes of the power stations with a combined cycle, Cand. Sc. (Tech.) Dissertation, 2008.
- *Magdi Raug Marzuk Roman.* Choice of the optimal algorithms of regulating systems in conditions of the indistinct information. Cand. Sc. (Tech.) Dissertation, 2008.
- *Nevzgodin V.S.* Perfection of the maintenance modes of the binary combined-cycle installations on the basis of the starting modes automation of the equipment. Cand. Sc. (Tech.) Dissertation, 2008.

Partners

- GASPROM company, Moscow
- PROMGAS company, Moscow
- TGK — regions generative companies, Russia
- Mosenergo company, Moscow
- Research and Production Association NPTeplopribor, Moscow
- MZTA Company, Moscow
- Central Research Institute for Comprehensive Automation (TsNIIKA), Moscow
- Power Engineering Institute named after G.M.Krzhizhanovskiy (ENIN)
- Elektrogorsk Research Center for Safety of Nuclear Power Stations (ENITs VNII AES),
- Elektrogorsk, Moscow region
- Institute of Technical Processes, Automation, and Process Measurements of the Applied
- Sciences University, Zittau, Germany
- SIEMENS company, Germany
- North-Chinese Electrical Power Engineering Institute, China
- National University of Cheju, Republic of Korea
- SAS Institute Co., USA

ITNPE

THERMAL ENGINEERING FUNDAMENTALS (TEF) DEPARTMENT NAMED AFTER M.P. VUKALOVICH

Ph.: (495) 673-4889, (495) 362-7760

At TEF Department:
20 teachers,
5 researchers,
6 Ph.D. students.

Head of Department
Ph. D. (Techn.)
Professor Andrey A. SUKHIKH

Main lines of research

Research Supervisor

- **Combined investigations of the thermal physical properties of the ozone-safe working medium of the new generation heat-pumps and refrigerating installations**
  Professors Alexandrov A.A., Sukhikh A.A. Associated-Professor Utionkov V.F.,
- **Investigation of the thermal physical properties of a water, a water steam and the water solutions for the thermal power engineering**
  Professor Alexandrov A.A
- **Complex investigation of the thermophysical properties of the working substances and the thermodynamic cycles of the high-temperature installations**
  Professor Sukhikh A.A.
- **The development of the high-efficiency heat-transfer systems**
  Associated-Professor Pronin V.A.
- **Convective heat-transfer intensification in the elements of the energetic equipment**
  Associated-Professor Velichko V.I.
- **The development of the mathematical and computer models for a heat-and-mass transfer in the two-phase binary mixtures**
  Professor Solodov A.P., Associated-Professor Ezhov E.V.
- **The investigation of the thermodynamic cycles for VGI**
  Professor Okhotin V.S.
- **Non-traditional energy sources**
  Professor Kazandjan B.I.
- **The numerical modeling of a heat-and-mass transfer in the elements of the energetic equipment**
  Associated-Professor Sidenkov D.V.
- **Hydrodynamics and heat-transfer in the swirl flows**
  Associated-Professor Tokarev Y.N.
- **Thermal dynamic cycle investigations for the steam-and-gas units**
  Professor Okhotin V.S.

Agreements, contracts, projects supported by the state budget

- The experimental investigation of the PVT-data at a saturation curve and in the single-phase region for the HFE-class substances and their binary mixtures
- Experimental and theoretical investigation of the thermophysical properties of the working substances and fluids in the high- and low-temperature installations
- Theoretical and experimental methods for investigation of the thermophysical properties of the working substances, fluids and materials

- Fundamental state equations for the technically important substances in the liquid and gaseous phases including a critical region
- The development of the calculation procedures and the technical proposals for a direct heat transfer in the VGI technology
- The development of an educational and scientific laboratory for an investigation of the supercritical cycles of thermal-transformers and a heat- and-mass transfer in the elements of the heat pumps and the local heat supplying systems

Key publications

- *Aleksandrov, A.A.* Comparative regeneration effectiveness in the reversed steam-compressor cycles (in Russian) // MPEI Vestnik. 2007. No 4 . P. 17—19.
- *Aleksandrov, A.A.; Orlov, K.A.* Thermodynamic properties of a humid air under high pressure and temperature (in Russian) // Teploperedacha. 2007. No 7. P. 36—39.
- *Solodov, A.P.* Differential model of the bubble boiling (in Russian) // Teplofisika vysokikh temperatur. 2007. Vol.45. No 2 . P. 226—235.
- *Arkharov, A.M.; Sychov, V.V.* Once more about an entropy and about the problems of determination of the real losses due to irreversibility (in Russian) // Kholodil'naya tekhnika. 2007. No 4. P. 8—13.
- *Arkharov, A.M.; Sychov, V.V.* To discussion on entropy. The answer to reviewer (in Russian) // Kholodil'naya tekhnika. 2007. No 7. P. 21—23.
- *Kostanovskiy, A.V.; Presniakov, D.V.; Kostanovskaya, M.E.* Reliability of the melting temperature measurement by means of the thin plate method (in Russian) // Izmeritel'naya tekhnika. 2007. No 7. P. 31—34.
- *Kostanovskiy, A.V.; Zeodiniv, M.G.; Kostanovskaya, M.E.* Determination of the fixed temperature with usage of metal-carbon eutectics (in Russian) // Izmeritel'naya tekhnika. 2007. No 6. P. 55—57.
- *Tokarev, Yu.N.; Komov, A.T.* Dynamics and the heat-exchange equations for a non-compressed liquid in the Cartesian-screw system of co-ordinates (in Russian) // Teplofisika vysokikh temperatur. 2007. No 4. P. 763—771.
- *Pronin, V.A.* Application of the air condensers in the power engineering. Information collection «Modern environmentally friendly technologies in the electrical power engineering» (in Russian) / Under edition of Putilov, V.Ya. MPEI Publishing House, 2007. P. 307—334.
- *Zhiliakov, L.A.; Kostanovskiy, A.V.* Experimental determination of the charged particle concentration in the beams sliding along a dielectric surface // Coll. of papers «Physics of the extreme states of substance» (in Russian) / Under edition of Fortov, V.E. Chernogolovka, 2007. P. 81—83.
- Arkharov, A.M.; Sychov, V.V. Comparison of the thermodynamic analysis results for power losses in the high-temperature and low-temperature systems, machines and installations (in Russian) // Kriogennye tekhnologii i oborudovanie. Promising developments: Proc. of Intern. Conf. Moscow, Nov. 14—15. 2007. P. 8—24.
- *Pronin, V.A.; Semenido, B.E.; Dozortsev, A.V.; Tyrin, V.E.* Hydrodynamics and a heat exchange of the plain-tube beams of the corridor and chess-diffusion assembling (in Russian) // Proc. of XVI seminar of academician Leon'tiev A.I. "Problems of gas-dynamics and heat-and-mass transfer in energy installations". In 2 volumes. MPEI Publishing House. 2007. Vol. 2. P. 384—387.
- *Computer* models of heat-and-mass transfer installations (in Russian) / N.A. Zharov; N.V. Egorova, M.V. Lazarev et al. // Ibidem, vol. 1. P. 415—418.
- *Zharov, N.A.; Pyschev, A.M.; Ezhov, E.V.* Special K-å-model of turbulence in a spray condensation (in Russian) // Ibidem, vol. 3. P. 17—18

- *Arkharov, A.M., Sychov, V.V.* The basis of an entropy and a statistical analysis of the real losses of power on the low and high temperature machines and plants // The Intern. congress ISP-2007 China. Beijing. 20—22 November 2007. P 21—26.
- *Zarudko, M.A.; Pronin, V.A.* Experimental investigation of the carbon fluorides (in Russian). Proc. of XIII Intern. Conf. Of graduate and PhD students. In 3 volumes. Moscow. MPEI Publishing House. 2007. P. 14—16.
- *Zhiliakov, L.A., Kostanovskiy, A.V.* Experimental determination of the charged particles concentration in the beams sliding along the dielectric surface (in Russian) // Proc. of XXII Intern. Conf. «Interaction of intensive energy flows and a substance» March 1—4, 2008. Russia, 2008. P. 58.
- *Pokhil, G.L.; Vokhmianina, K.A.; Zhiliakov, L.A.* Peculiarities of an ion transfer via a plain capillary (in Russian) // Proc. of XXXVII Intern. Conf. "Physics of interaction of charged particles swith crystals. Russia, Moscow. May 29—31, 2007. P. 19.
- *Kostanovskiy, A.V.; Zhiliakov, L.A.; Pronkin, A.A.; Kirillin, A.V.* Production of the thin diamond films at magnetron dispersion of a graphite target (in Russian) // Proc. of II Intern. Conf. "Nano-dimension systems: structure-properties-technologies NANSYS-2007». Ukraine. Kiev. Nov. 21—23, 2007. P. 351.
- *Sukhih, A.A.; Zakopyrin, M.A.; Utionkov, V.F.* State equation of a virial type and the tables of the thermodynamic properties of an alternative refrigerant HFE-347 mcc (in Russian) // Kholodil'naya tekhnika. 2007. No 5. P. 22—25.
- *Network* calculations of the processes and cycles of the thermal power engineering installations(in Russian) / V.F. Ochkov; A.A. Aleksandrov; K.A. Orlov et al. // Novels in Russian Electrical power engineering (in Russian). 2008. No 10.
- *Alexandrov, A.A.; Ochkov, V.F.; Orlov, K.A.* Steam Tables and Diagrams on MathCAD Calculation Server for Personal Computers, Pocked Computers and Smart Phones: Water, Steam, and Aqueous Solutions // Proc. 15th Intern. Confer. Properties of Water and Steam. Berlin, 2008.
- *Ochkov, V.F.; Alexandrov, A.A.; Orlov, K.A.; Ochkov, A.V.* Thermodynamic Cycles: Calculations on the Internet // Proc. 7th Intern. Conf. Power System Engineering, Thermodynamics and Fluid Flow. Pilsen, 2008. P. 165—174.
- *Finding* the Values of Steam Properties with MathCAD / A.A. Alexandrov, V.F. Ochkov, K.A. Orlov, A.V. Ochkov // PTC Express. 2008. No 4. P. 1—6.
- *Ochkov, V .F.; Aleksandrov, A.A.; Orlov, K.A. Ochkov, A.V.* Properties of a heat carrier and the working media for the power engineering: information in Internet (in Russian) // Novels in Russian Electrical power engineering. 2008. No 1. P. 28—43.
- *Aleksandrov, A.A.; Petrova, T.I.; Ochkov, V .F.; Smetanin; D.S.* Annual scientific session MASVP (in Russian) // Teploenergetika. 2008. No 7. P. 77—78.
- *Sukhikh, A.A.; Zakopyrin, M.A.; Utionkov, V.F.* Experimental density determination and a construction of a local equation of the binary refrigerant R14-HFE347mcc system state in a gas phase (in Russian) // Kholodil'naya tekhnika. 2008. No 6.
- *Solodov, A.P.* Micro-heat-exchangers (in Russian) // Novels in Russian Electrical power engineering. 2008. No 5.
- *Antanenkova, I.S.* Proc. of All-Russia Conf. of students, PhD students and young scientists — laureates of a competition of the Ministry of Education and the State foundation for small company development assistance in scientific area (in Russian). Altai State Technical University Publisher.
- *Okhotin, V.S.* Thermodynamic analysis of the various heat supply schemes and the energy saving issues (in Russian) // Coll. of papers "Thermophysical problems of energy saving. 2008. P. 54—67.

- *Okhotin, V.S.* Possibilities of the combined units with a recovery boiler and fuel afterburning (in Russian) // Ibidem, P. 9.
- *Solodov, A.P.* Electronic lecture course «Heat-and-mass exchange in power engineering installations» (in Russian) // Engineering education informatization. MPEI electronic education resources. MPEI Publishing House, 2008. P. 87—88.
- *Filatov, N.Ya.; Aleksandrov, A.A,; Okhotin, V.S.; Utionkov, V.F.* Supporting system for practical classes. Book of problems on technical thermodynamics (in Russian) // Ibidem, P. 109—110.
- *Sidenkov, D.V.; Shukhikh, A.A.; Velichko, V.I.* Thermal engineering fundamentals of the heat-pump systems (in Russian) // Ibidem, P. 111—114.
- *Aleksandrov, A.A,; Okhotin, V.S.; Tsariov, V.V.* Mathematical modeling of the thermodynamic cycles of the steam turbine installations. Laboratory practical work (in Russian) / / Ibidem. P. 119—120.
- *Bobrova, T.A.; Kapitanova, E.A.; Okhotin, V.S.* Testing systems on a thermodynamics, a technical thermodynamics, the theoretical fundamentals of the heat engineering (in Russian) // Ibidem. P. 121—122.
- *Ion controlling* with the help of a plain dielectric channel (in Russian) / G.P. Pokhil, R.A. Vokhmianina; L.A. Zhiliakov et al. // Izvestia RAN. Physical series. 2008. Vol. 72. N o 5. P. 647—679.
- *Zhiliakov, L.A.; Kostanovskiy, A.V.; Pokhil, G.P.* Formation condition of the 2D Coulomb crystal on a dielectric surface (in Russian) // TVT. 2008. Vol. 46. No 5. P. 786—789.
- *Pronkin, A.A.; Zhiliakov, L.A.; Kostanovskiy, A.V.; Kirillin, A.V.* Carbon film synthesis under magnetron dispersion of a graphite target and its properties (in Russian) // Proc. of Intern. Conf, "Physical-chemical fundamentals of formation and modification of micro- and nanostructures», Nov. 8—10, 2008. Kharkov, Ukraine. Vol. 1. P. 126—129.

Dissertations

- *Pronin V.A.* Pipe beam assembling and synthesis of the convection heat-exchange surfaces with an improved effectiveness: Dr. Sci. (Techn.) Dissertation. 2008.

Patents

- *Patent (RF) on invention No 2329437.* Solar collector (variants and production way for the solar collector envelope) / B.I. Kazandzhan // BI. 2008.
- *Patent (RF) on useful model No 75879.* Heat-pumping installation / A.A. Sukhikh, I.S. Antanenkova // BI. 2008. No 24.
- *Patent (RF) on useful model No 2008125653.* Heat-exchange apparatuses / A.A. Sukhikh, I.S. Antanenkova // БИ. 2008.

Partners

- Institute of experimental mineralogy Russian Academy of Science, Chernogolovka-town, Moscow region
- Institute of solid state physics, Russian Academy of Science, Chernogolovka-town, Moscow region
- Ministry of Fuel and Energetic of Russian Federation, Moscow
- JSC «Gasprom, Moscow.
- All-Russian scientific—research institute of oil machine building (VNIINEFTEMash), Moscow
- Kazan State University of Technology, Kazan.

- State academy of refrigeration and food technologies, St.Peterburg.
- All-Russian scientific—research center of standardization, informatization and certification of raw materials, materials and substances, Moscow
- FGUP R&D Institute of Energy Technologies, Moscow
- State Research Center "All-Russia R&D Institute of Non-Organic Materials named after Bovhvar", Moscow
- All-Russia R&D Institute of Oil Machinery, Moscow
- All-Russia R&D Institute of Natural Gases and Gas Technologies, Razvilka, Moscow Region
- Podolsk Machinery Plant, Podolsk, Moscow Region
- FGUP "R&D Institute of Electrical Power Engineering named after Dolezhal", Moscow

Unique equipment

- Experimental installation of a high precision level for determining of the vapor-liquid equilibrium and the volumetric characteristics of the low boiling mixtures
- Experimental installation of a high precision level for investigation of a heat conductivity, heat capacity and resistance of high temperature super-conductive substances
- Educational and scientific unit «Heat pump TH-300»
- Educational and scientific unit «Heat pump THCO2»

ITNPE

BOILER PLANTS AND POWER ENGINEERING ECOLOGY (BPPEE) DEPARTMENT

Ph.: (495) 362-7734, (495) 673-5468,
E-mail: ProkhorovVB@mpei.ru

On BPPEE Department:
16 teachers,
10 researchers,
6 Ph.D. students.

Head of Department
Dr. Sci. (Techn.),
Professor Nikolay A. Zroychikov

Main research activities

Research Supervisors

- **Investigation of an air pollution in the industrial cities and energy complexes by the power engineering enterprise emissions and development of he automated data banks for the TPP equipment and the boiler-houses**
  Associated-Professor Prokhorov V.B.
- **Development of the catalytic TPP at complete prevention of the nitrogen oxide formation**
  Associated-Professor Prokhorov V.B.
- **Development, investigation and implementation of the high-efficient technologies for the coal, gas and oil burning stage on the basis of a flame aerodynamic optimization**
  Leading Researcher Arkhipov A.M.
- **Reliability, efficiency and ecological improvement of the ash and slag removal and the dust preparation on the TPP**
  Senior researcher, Director of CPPEE MPEI Putilov V.Y.
- **Optimization of the fuel usage and the heat supply**
  Associated-Professor Izvekov A.V.
- **Noise reduction from the power engineering equipment**
  Professor Tupov V.B.
- **Nitrogen oxides emission reduction of the power engineering equipment and the firing sterilization of the waste waters**
  Professor Kormilitsyn V.I.
- **Ash collecting degree increase in the electrostatic precipitators**
  Senior Researcher Chernov S.L
- **Aerodynamic optimization of the TPP gas-air channels and the operation reliability increase for chimneys**
  Associated-Professor Prokhorov V.B., Senior Researcher Chernov S.L

Contracts, projects supported by the state budget

- Development of the ecologically pure catalytic power plant of low power
- Aerodynamic calculation fulfillment of the gas channels and a chimney and the external gas flue parameter choice for the PGU-450T unit of the Severnaya TPP and TPP-21 of Mosenergo
- Working project development of the two steam noise silencer for the lighting lines of the 4th and 5th boilers of the same standard size under conditions of the TPP-9 of Mosenergo and its co-ordination project
- Calculation execution for the noise silencer efficiency determination for the exhaust-heat boiler FT-8.3 and its construction development

- Best noise silencer construction choice of an aerial channel of the PTVM and KVGM boilers for «Tushino-3», «Khimki-Khovrino», «Novomoskovskaya» and «Nagatino». Implementation project development
- Acoustical measurement fulfillment near the equipment and on the outlet cut of the chimney KTS-54
- Noise silencer construction choice on the smoke exhauster outlet jets for the TGMP-314 boiler of the 8th and 9th power units at the TPP-21 of Mosenergo. Implementation project development
- Investigation and optimization of the stage Kuznetsky coal burning technology in the TP-87 boilers with liquid slag removal at the Zapadno-Sibirskaya TPP
- Recommendations development and the regime-adjustment tests execution at the BKZ-220 boiler of the Kusnetskaya TPP after installation of the tertiary blowing nozzles in order to reduce the nitrogen oxides emission
- Nitrogen oxides emission reduction at the PK-40-1 boilers of the Tom-Usinskaya GRES
- Development and implementation of a dispersion device for the liquid waste waters polluted by the mineral oil, for firing sterilization in the steam boiler furnace
- Development and implementation of a cavitation device for the water-oil emulsion preparation
- TGMP-314C boilers testing on the TPP-23 of Mosenergo at water-oil mixture firing
- Standard development «TPP. Ecological Safety. Acoustic impact (noise)»
- Range of works on the noise reduction in a gas channel of the exhaust heat boiler of the Kashirskaya TPP — a branch of the WGC-6
- Design and survey work «Installation of the acoustic screens for the cooling towers # 3 and 4 from the urban development side for the TPP-16 of the JSC «Mosenergo»
- Development of recommendations and a working documentation of a noise silencer at the air-intake device of the power boiler # 22 at Hydraulic Power Plant # 1 — a branch of the JSC «Mosenergo»
- Development of recommendations and a working documentation of the noise silencers at the air-intake device of three PTVM-60E boilers at the Regional Heating Station «Nekrasovka»
- Noise suppression measures at KTS-28 (address: Boytsovaya str., 24), KTS-42 (address: 4th Grazhdanskaya str., 41A) of the branch # 4 «Vostochnyj» of the JSC MOEK
- Working documentation preparation for the GPK noise silencer of a power boiler at the TPP-9 — a branch of the JSC «Mosenergo». Carrying on noise suppression tests after their installation.
- Participation in the World-wide Conference on ash from TPPs «World of Coal Ash»
- Participation in the International Conference «EuroCoalAsh» in Warsaw, Poland
- Execution of joint researches on erosion in pipelines of pneumatic conveying installations and definition of critical velocities at pneumotransport of fine bulk silicon-containing materials in the Industrial Tribology, Machine Dynamics and Maintenance Engineering Centre of Indian Institute of Technology

Key publications

- ***Putilov, V.Ya.; Putilova, I.V.*** Analysis of the world trends and prospects on solving the problem of ashes from Russian TPPs (in Russian) // International Scientific and Practical Workshop «Ashes of TPPs — removal, transport, processing, landfilling», March 23, 2007, Moscow, MPEI Publishing House. P. 53—59
- ***Putilov, V.Ya.; Putilova, I.V.*** Dependence of erosion in the dust pipelines of the TPPs pneumo-transport installations from the chemical and mineralogical composition of the

transported materials (in Russian) // Energy saving and water treatment, No 2, 2007, P. 40—42

- *Putilov, V.Ya.; Putilova, I.V.* Dependence of erosion in the pneumo-transport pipelines of TPPs from a criterion of aerodynamic ease of the transported material particles (in Russian) // MPEI Vestnik, No 2, 2007, P. 63—67
- *Putilov, V.Ya.; Putilova, I.V.; Lun'kov, A.M.* Some aspects of implementing ecologically sound ash removal technologies at reconstruction of the coal-fired power plants in Russia // Proc. of Intern. Conf. «World of Coal Ash», May, 7—10, 2007, Covington, Kentucky, USA
- *Putilov, V.Ya.; Putilova, I.V.* Estimation of pipelines overhaul life duration of installations for pneumatic transport of ash and coal dust of TPPs and recommendations on its increase // Ibidem.
- *Putilov, V.Ya.; Putilova, I.V.* Dependence of erosion of the pneumo-transport pipelines of TPPs on the factor of reliable transportation of the fine bulk materials. Energy saving and water treatment (in Russian) // No 5, 2007, P. 42—44
- *Putilov, V.Ya.; Putilova, I.V.* Some issues of optimizing the schemes of the pneumatic ash removal systems of the thermal power plants. Proc. of Intern. Symp. on Pneumatic Conveying Technologies. Oct., 18—20, 2007, Beijing, China, P. 137—146
- *Putilov, V.Ya.; Putilova, I.V.* Estimation of erosion in the pipelines at the fine bulk materials pneumo-transport installations. // Ibidem. P. 137-146
- *Chugunkov, D.V.; Tupov, V.B.* Calculation of noise at a steam discharger in the power boilers (in Russian) // Thermal power engineering. 2007. No 2. P. 62—65
- *Chugunkov, D.V.; Tupov, V.B.* Calculation of the steam jet noise at their discharge into atmosphere (in Russian) // Thermal power engineering. 2007. No 6. P. 71—73
- *Tupov, V.B.* A problem on noise suppression from the TPP equipment (in Russian) // Industrial ecology. 2007. No 3. P. 4—6
- *Zroychikov, N.A.; Lyskov, M.G.; Prokhorov, V.B.; Morozova E.A.* Optimization of a mode of oil burning in the furnaces of the large capacity boilers (in Russian) // Thermal power engineering. 2007. No 6. P. 32—27
- *Tupov, V.B.; Chugunkov, D.B.* Use of the noise silencers at a steam discharge into atmosphere (in Russian) // News in the Russian electric power engineering. 2007. № 12. P. 41—49
- *Kormilitsyn, V.I.; Basov, Y.K.; Ganiev, S.R.* Ecological problems of the manufacture and the usage of surfactants (in Russian) // Proc. of the scientific session. Moscow: MSTU named after A.N. Kosygin, 2007. P. 23—24
- *Sergeev, V.D.; Nikishin, K.S.; Zonov, A.A.; Dubrovskiy-Vinokurov, I.Ya.* About features of the octadecylamine properties // MPEI Vestnik. 2007. No 4. P. 27—30
- *Zonov, A.A.; Sergeev, V.D.; Dubrovskiy-Vinokurov, I.Ya.* Conservation of the peak hot water boiler by a static long-term method (in Russian) // News in the Russian electric power engineering. 2007. № 3. P. 44—47
- *Putilov, V.Ya., Putilova, I.V.* Main methodical propositions for creating the technologically safe, economically reasonable and ecologically sound ash and slag removal systems at the thermal power plants (in Russian) // Proc. of IV Intern. Forum «Energy and ecology», Jan., 15-16, 2008, Moscow, JSC «MTSDK «Delkont» Publisher. Moscow. P. 88—89
- *Putilov, V.Y.; Putilova, I.V.; Malikova, E.A.* Reconstruction of the ash and slag removal systems of the TPPs. Industrial ecology (in Russian). Specialized info bulletin No 2(11), Moscow. Publishing house «Otraslevye vedomosti», 2008. P. 10—14.
- *Specific* operational expenses on handling of the ash and slag from the coal-fired thermal power plants by example of the Kashirskaya SDPP (in Russian) / Putilov V.Ya.,

Lun'kov A.M., Fatkullin R.M., et al. // Energy saving and water treatment, No 3, 2008, P. 35—38

- *Putilov, V.Ya.; Lun'kov, A.M.* Installations and technologies of the bottom ash removal at the thermal power plants in Russia (in Russian) // MPEI Vestnik. 2008. No 4. P. 40—48
- *Putilov, V.Y.; Putilova, I.V.* Estimation of the main integral indices of the new and reconstructed ash and slag removal systems of the TPPs in Russia by example of the Reftinskaya SDPP of the JSC «WGC-5» (in Russian) // All-Russia meeting on ash and slag processing and utilization from thermal power plants, June, 10-11, 2008, Novosibirsk, NSTU, — Novosibirsk, P. 55—64
- *Putilov, V.Y.; Putilova, I.V.* About creation of the national web-site «Coal combustion by-products from TPPS of Russia». Monograph. // International Conference Euro-CoalAsh 2008», Warsaw, October 6—8, 2008, (Poland), EKOTECH Sp.z.o.o., Szczecin, P. 165—174
- *Putilov, V.Y.; Putilova, I.V.* On necessity of the system approach for effective solution of the problem on ash and slag from TPPs. Monograph. // International Conference EuroCoalAsh 2008», Warsaw, October 6-8, 2008, (Poland), EKOTECH Sp.z.o.o., Szczecin, P. 407—410
- *Verhovskiy, G.E.; Samoylov, Y.F.; Kovalenko, N.P.* To the choice of a color palette of videograms of the TPP operator-technologist (in Russian) // MPEI Vestnik. 2008. No 10. P. 142—146
- *Tupov, V.B.; Chugunkov, D.B.* Use of the noise silencers at the steam discharge on the industrial plants (in Russian) // Industrial ecology. 2008. No 1 (10). P. 1—4
- *Semin. S.A.; Tupov, V.B.* Method of optimizing a construction of the absorption noise silencers in the exhaust line of the gas-turbine plant (in Russian) // Thermal power engineering. 2008. No 3. P. 74—77
- *Kormilitsyn, V.I.; Ganiev, S.R.; Ukrainskiy, L.E.* Wave technology of preparation of the alternative fuels, and efficiency of their combustion (in Russian). Regular and chaotic dynamics. 2008. 116 p.
- *Kormilitsyn, V.I.; Ezhov, V.S.* Mechanism of the nitrogen oxides oxidation processes at the simultaneous purification and utilization of the gaseous emissions from the thermal generating plants (in Russian) // Energy saving and water treatment. 2008. No 3. P. 68—70
- *Kormilitsyn, V.I.; Fomin, V.N.; Malyukova, E.B.* About wave impact based on the hydrocarbons (in Russian) // Chemical industry. 2008. P. 7—10
- *Kormilitsyn, V.I.; Ganiev, S.R.; Cheredov, V.V.* Calculation of the hydrodynamic and cavitation characteristics of the liquid flow in flowing channels after the turbulent lattices (in Russian) // Proc. of Conf. «Heat-mass-exchange in the swirl flows», Moscow: RAN Publisher, 2008. P. 43—44
- *Polivoda, F.A.* Heating network efficiency on the example of pipelines with an urethane foam insulation (in Russian). «News of heat supply». Moscow, 2008. No 11. P. 43—46

Patents

- *Patent 2306972.* Device for homogenization and preparation of the mixtures / V.I. Kormilitsyn, R.F. Ganiev, L.E. Ukrainskiy, et al. 2007
- *Patent 2310132.* Method of preparation and combustion of liquid fuel and device for its implementation / V.I. Kormilitsyn, R.F. Ganiev, O.P. Andreeva, et al. 2007
- *Patent 2310133.* Power installation for the liquid fuel combustion / V.I. Kormilitsyn, R.F. Ganiev, L.E. Ukrainskiy, et al. 2007

Dissertations

- *Chugunkov D.V.* Development of the calculation methods and a noise reduction from the under-expanded jets of the steam discharge of the power complexes: Cand. Sci. (Techn.) Dissertation. 2007.
- *Semin S.A.* Development of the noise reduction methods from the exhaust lines of the gas-turbine plant with the exhaust heat boilers: Cand. Sci. (Techn.) Dissertation. 2008.

Partners

- JSC «All-Russia Thermal Engineering Institute» (JSC «VTI»), Moscow
- JSC «Institute VNIPIEnergoprom», Moscow
- JSC «Institute Mosenergoproject»
- JSC «Institute Teploelektroproekt», Moscow
- JSC «Institute Energosetproekt», Moscow
- JSC «Mosenergo», Moscow
- JSC «URALORGRES», Yekaterinburg
- JSC «URALVNIPIENERGOPROM», Yekaterinburg
- JSC «Firm ORGRES». Moscow
- JSC «ENIN», Moscow
- American Coal Ash Association (ACAA), USA
- European Coal Combustion Products Association (ECOBA), Germany
- JSC «Energy Forecasting Agency» (CJSC «EFA»), Moscow
- JSC «Complex Energy Systems», Moscow
- Indian Institute of Technology (IIT Delhi)
- Moscow State Open University (MSOU)
- Bauman Moscow State Technical University (MSTU of N.E. Bauman)
- JSC «Intersystem Electric Networks» (ISEN) of the Centre
- JSC «WGC-5»,Moscow
- JSC «Cherepetskaya TPP»- a branch of the WGC-3, Suvorov, Tula Region
- JSC «CKB Energoremont», Moscow
- JSC «Centre for Energy Efficiency of UES», Moscow
- JSC «Energostroyinvest-Holding», Moscow
- JSC «Ekopolis», Moscow
- Polish CCP Union
- Company UralORGRES («Power Engineering Center of Urals»), Yekaterinburg
- TPP-23 of the JSC «Mosenergo»
- University of Kentucky, USA

Unique equipment

- Two-channel analyzer Virte 3000 and other modern equipment for acoustic measurements

ITNPE

NUCLEAR POWER PLANTS (NPP) DEPARTMENT

Ph.: (495) 362-7351, fax: (495) 362-7351,
E-mail: KuznetsovVD@mpei.ru

At NPS Department:
20 teachers,
2 researchers,
5 engineers and technicians
12 Ph.D.-students.

Head of Department
Dr. Sci. (Techn.),
Professor Vladimir N. BLINKOV

Main lines of research

Research Supervisor

- **The investigation of the transport and distribution of the impurities in the NPP steam generating equipment**
  Professor V.I. Gorburov
- **Estimation and control of resource of the NPP constructive materials anв equipment**
  Professor V.P. Gorbatykh
- **Analysis of the NPP accidental regimes**
  Associated-Professor Y.B. Vorobiev
- **Thermal-hydraulics of the NPP**
  Professor O.I. Melikhov
- **Modeling and calculation of the NPP technological schemes**
  Professor V.M. Zorin
- **Technical and economic analysis of the nuclear fuel cycle**
  Associated-Professor M.M. Kaverznev

Agreements, contracts, projects supported by the state budget

- The development of the blowdown regulations in the regimes of the NPP unit stoppage to decrease radiation dose on the Smolensk NPP personnel during NPP repair
- The development of the recommendations for verifying calculation of the thermal scheme of the NPP steam turbines
- The development of the technical and economic feasibility study of the actions to decrease the heat and electrical energy consumption of the plant auxiliary electrical system
- Modernization of the equipment elements of the experimental data base for the NPP with VVER and actions to protect information.
- Theoretical and experimental investigation of the thermal hydraulic parameters of the annular fuel assemblies of the new generation reactors

Key publications

- *Melikhov, O.I.; Melikhov, V.I.; Parfenov, Yu.V.* The uncertainty analysis of the calculation of the large break loss of coolant accident test // Izvestia Vuzov. Nuclear power engineering. 2007, No 4, p. 109—118 (in Russian)
- *Melikhov, O.I.; Melikhov, V.I.; Yakush, S.E. et al.* Modeling of the high-temperature interaction of the corium with coolant // Izvestia RAN. Ser. Energetika. 2007, No 6, p. 11—28 (in Russian)

- *Melikhov, O.I.; Melikhov, V.I.; Yakush, S.E.* Analysis of the large-scale experiments on the interaction of the corium with water with the VAPEX code //Teplofizika vysokikh temperatur. 2007. V. 45, No 4. P 565—574 (in Russian)
- *Melikhov, O.I.; Melikhov, V.I.; Parfenov, Yu.V.; Yakush, S.E.* Analysis of the thermal regime of the operation of the filter facility // Journal of Applied Mechanics and Technical Physics, 2007, V. 48, No 6, p. 92—102 (in Russian)
- *Y. Parfenov, O. Melikhov, V. Melikhov et al.* Modeling of Water Hammer in a Vertical Tube with WAHA Code // Intern. Conf. «Nuclear Energy for New Europe», 2008, Portoroz, Slovenia, September 8—11 // Book of Abstracts, № 308
- *Melikhov, O.I.; Melikhov, V.I.; Parfenov, Yu.V.* Mathematical modeling of the thermal-hydraulic processes in the horizontal steam generator with STEG code // News of Russian Power Engineering. 2008. No 8. P. 21—33 (in Russian)
- *Proskurykov, K.N.; Shakirzyanov, F.N. et al.* The method to prevent resonance vibrations of the fuel elements and fuel assemblies of the VVER-1000 // Problems of the Nuclear Science and Technology. Ser. Physics of the Nuclear Reactors. 2008. No 23 (in Russian)
- *Andreev, A.V.* The development of the methods of the numeric-analytical solution of the singular integral equations with applications to the problems of the mechanics. Preprint of the Institute of Applied Mechanics of the Russian Academy of Sciences, 2007, No 843, p. 39 (in Russian)
- *Blinkov, V.N.; Asmolov, V.G.; Efanov, A.D. et al.* Problems of the heat-and-mass transfer and safety in the NPP projects of the new generation // Proc. of the 5th Baltic Conf. on heat transfer. St Petersburg , Sept., 19-21, 2007. P. 21—32 (in Russian)
- *Blinkov, V.N.; Asmolov, V.G.; Efanov, A.D. et al.* Thermo-physical investigations to provide NPP safety // Lecture on the Scientific Technical Counsel of Rosatom. 2007, No 9. P 25—33 (in Russian)
- *Melikhov, O.I.; Melikhov, V.I.; Parfenov, Yu.V.* The uncertainty and sensitivity analysis of the ATHLET calculation results of the experiment with large break loss of coolant at the BC V-213 test facility // Russian Scientific-Practical Seminar «Accuracy and uncertainty of the codes used for assessment and providing safety of the objects of the nuclear engineering». Scientific and Engineering Center of the Nuclear Radiation Security of the Rostekhnadzor: Proceedings. Moscow, March, 13—14, 2007 p.91-98 (in Russian)
- *O. Melikhov, V. Melikhov, S.* Yakush Verification of Fuel-Coolant Interaction Model for Severe Accident Simulations // Book of Abstracts of the Intern. Conf. «Nuclear Energy for New Europe». Portoroz, Slovenia, 10-13 Sept. 2007, P. 45
- *Andreev, A.V.* Method to determine peculiarities of the solutions of the singular integral equations and it's relation with some problems of mechanics // Proc. of Intern. Conf. «XVIII session of the International school on the models of the solid state», Aug., 27 — Sept.,1, Saratov, Russia, p.4 (in Russian)
- *Andreev, A.V.* Asymptotic analysis of the solutions of one class of the singular integral equations with the generalized kernels and conjugated variables // Book of Abstracts of the International Youth Scientific Conference «XXXI Gagarin's readings», Moscow, MATI-RGGU, April, 3—7, p. 86 (in Russian)
- *Blinkov, V.N.; Davydov, M.V.* EREC-STRESA — Web Database of Thermohydraulic Experiments on NPPs Safety // Proc. of the Intern. Conf. on Nuclear Engineering (ICONE-16), Orlando, Florida, USA, May, 11—15, 2008
- *Vorobyev, Yu.B.; Kuznetsov, V.D.; Din Chuk Nam.* Modern informational technologies and dynamic probabilistic analysis of the NPP safety // VI International Scientific Conference «Safety, economics and effectiveness of the nuclear energy (MNTK-2008)» (in Russian)

- *Vorobyev, Y.B.* The set of the codes for automatic safety analysis of the NPP // Intern.l «Exhibition of the scientific and technical achievements — 2008», China, Harbin, June, 15—19, 2008
- *Yu. Vorobyev.* Dynamic Probabilistic Risk Assessment for NPP Accident Management Analysis // 2nd Computational Nuclear Power Safety Seminar, Royal Institute of Technology, Stockholm, Sweden, October, 31, 2008
- *Belov, I.V.; Vorobyev, Yu.B.* The use of the modern calculation and information technologies for increasing of the possibilities of the integral thermal-hydraulic codes // Intern. scientific-innovation conf. of the students, post-graduates and young specialists «Northern Lights», 2008 (in Russian)
- *Proskurykov, K.N.; Novikov, K.S.* The reasons of the growth of the high-cycle loading in the reactors with water coolant and water moderator // Proceedings of the VII International Conference on Thermal-hydraulics, Operation and Safety of the Nuclear reactors, Seoul, Korea, October, 5—9, 2008
- *Proskurykov, K.N.; Novikov, K.S.* The peculiarities of the prevention of the rise of the resonances of the acoustic vibrations with vibrations of the fuel assemblies and fuel elements under supercritical parameters // Proc. of Intern. Seminar «Water and steam with the supercritical parameters in the nuclear engineering: problems and solutions», October, 22-23, 2008, Moscow: Nikiet
- *Proskurykov, K.N.; Parshin, D.A.* The sound velocity in the two-phase coolant of the RBMK-1000 core: Proceedings of the MNTK-2008, Moscow, May, 21—23, 2008.

Partners

- Scientific and Engineering Center of the Nuclear Radiation Security of Rostekhnadzor of Russia, Moscow
- JSC «Concern Energoatom», Moscow
- JSC «Atomenergoproekt», Moscow
- JSC «Electrogorsk Research and Engineering Center on NPP Safety», Electrogorsk, Moscow region

Unique equipment

- Analytical simulator of the NPP with VVER-1000 reactor
- Undercritical uranium-water facility
- The set of the research laboratory facilities to study corrosion of the constructional materials of the NPP

ENGINEERING THERMOPHYSICS (ETP) DEPARTMENT

Ph.: (495) 918-1401, (495) 362-7073, (495) 673-2157,
fax: (495) 362-7674,
E-mail: Svir idovVG@mpei.ru

At ETP Department:
22 teachers,
17 researcher,
7 Ph.D. students.

Head of department,
Dr. Sci. (Techn.),
Professor Valentin G. SVIRIDOV

■ Main lines of research

Research Supervisor

- **Turbulence structure research**

  Professor. Sviridov V.G.
- **Automatic control of a scientific experiment. Technology development of the automatically controlled laboratory practical work with the remote distance computer access.**

  Professor Sviridov V.G.
- **Hydrodynamics and a heat transfer in the liquid metal flows in a magnetic field.**

  Professor Genin L.G.
- **Processes of a heat-and-mass transfer in the case of the intensive heat and electric field action in connection with the problem of the space electric power stations.**

  Professor Sinkevich O.A.
- **Heat-and-mass transfer in the highly intensive processes of the phase transition fluid — vapor.**

  Professor Yagov V.V.
- **Researches of the thermodynamic properties of the materials in the wide range state parameters**

  Professor Makhrov V.V.
- **Creation of the reference data about the thermodynamic properties of the chemically reacting gases. Thermodynamics of the non-equilibrium systems.**

  Professor Semenov A.M.
- **Heat-and-mass transfer in boiling of the aqueous solutions. Intensification of the heat transfer process in one- and two-phase media.**

  Professor Kuzma-Kichta Yu.A.
- **Condensation of the clean vapor, the vapors mixtures and the vapor-gas mixtures on surfaces with the heat transfer intensification research.**

  Associated-Professor Smirnov Yu.B.
- **Working-out of the various methods of the thermodynamic parameter measurements and the initial transducers of the physical parameters.**

  Associated-Professor Miroschnichenko V.I.
- **Research of the thermodynamic properties, the technological characteristics and the thermodynamic cycles of the ozone-friendly substances.**

  Associated-Professor Ustiuganin E.E.
- **Development of the mathematical models, the algorithms, the universal program means and numerical modeling of the complex heat-and-mass transfer processes.**

  Dr. Sci. Yankov G.G.

Agreements, contracts, projects supported by the state budget

- Mathematical modeling of the hydrogen store and purification in the metal—hydride reactors to optimize construction and the working regimes of devices and the development of the experimental set-up to investigate the effective heat transfer process in the hydrogen-absorbing materials.
- Development of scientific and methodological base for parallel computing with the help of ANES numerical code and analysis of heat-and-mass transfer processes in elements of various devices including mini- and micro-channels by direct numerical modeling.
- Numerical analysis of the various methods to intensify the processes of hydrogen sorption/desorption in the hydrogen store and purification metal—hydride systems.
- New high temperature reactors of the reversible solid-state hydrogen store of extra volume: investigation of the fundamental problems of heat-and-mass transfer, modeling and creation of the experimental prototypes.
- Experimental, numerical and theoretical investigation of heat-and-mass transfer processes as well as a high temperature deformation in VVER reactors for in-body confinement of corium in case of the severe accident.
- Development of a mathematical model of the distributed computer net (cluster) and numerical and theoretical investigation of the net architecture influence on calculation of the speed and data storage and processing.
- Mathematical model development of the distributed computer net with non-uniform loading of the different calculation nods. Investigation of the communication channel maximum data transfer speed on efficiency of the distributed computer net calculation speed in process of the numerical experiment.
- Investigation of the transient and film boiling generalities for the saturated and overheated liquid.
- Investigation of mechanism and the detailed heat transfer model development of the metal quenching process.
- Processes of heat-and-mass transfer in the case of the intensive heat and electric field action in connection with the problem of the space electric power stations.
- Theoretical and experimental investigation of the dynamic processes preceding and accompanying the boiling crisis.
- Investigation of hydrodynamics and heat transfer in the liquid metal flows in the magnetic field.
- Development of the automatic control of the scientific experiment systems.

Key publications

- *Ochkov, V.F.; Yankov, G.G.* Mathematical packages and the knowledge transfer problems / Softline direct (in Russian). 2008. NSLD-9(84)-RU.
- *Artemov, V.I.; Borovskikh, O.V.; Lazarev, D.O.; Yankov, G.G.* Numerical analysis of heat-and-mass transfer in the cased-piped hydrogen metal—hydride accumulator based upon the mathematical model of a porous medium (in Russian) / MPEI Vestnik. 2008. No 1. P. 11.
- *Ochkov, V.F.; Yankov, G.G.* Mathematical packages and the knowledge transfer problems / Problems of heat and mass transfer and hydrodynamics in power machine design. Reports. Invited lectures (in Russian).// VI School-seminar of young scientists and specialists of V.E. Alemasov. 2008. Kazan: Kazan State university Publishing House, 2008. P. 13—22.
- *Artemov, V.I.; Borovskikh, O.V.; Lazarev, D.O. et al.* Efficiency estimate for fins in the active volume of the hydrogen metal—hydride accumulator // Problems of gas dynam-

ics and heat and mass transfer in power generating facilities (in Russian). Proc. XVI school-seminar of young scientists and specialists of Leontiev A.I. May 21—25, 2007. St. Petersburg. MPEI Publishing House, 2007.

- *Yagov, V.V.* Heat transfer under nucleate boiling: possibilities and limits of the theoretical analysis (in Russian) // Thermal Engineering. 2007. No 3. P. 2—8.
- *Yagov, V.V.* About the basic mechanism of the nucleate boiling (in Russian) // Thermal Engineering. 2008. No 3. P. 58—64.
- *V.V. Yagov.* Nucleate boiling heat transfer: possibilities and limitations of theoretical analysis. J. Heat Mass Transfer. Special issue, Springer — Verlag 2007. DOI. 10.1007/s 00231-007-0253-8.
- *Genin L.G., Sviridov V.G.* Introduction to the theory of statistical turbulence (in Russian). MPEI Publishing House. 2007. 128 P.
- *Automatic* control of the scientific experiment systems (in Russian). Ed. by Sviridov V.G. MPEI Publishing House. 2007. 256 P.
- *Valueva, E.P.; Sviridov, V.G.* Introduction to the fluid dynamics (in Russian). MPEI Publishing House. 2007. 208 P.
- *Labuntsov, D.A.; Yagov, V.V.* Mechanics of the two-phase systems ((in Russian). 2-nd ed. revised and supplemented. MPEI Publishing House. 2007.
- *Sedlov, A.S.; Kuzma-Kichta, Y.A.* Hydrodynamics and heat transfer in boiling aqueous solutions (in Russian). MPEI Publishing House. 2007. 164 P.
- *Genin, L.G.; Dorofeev, D.I.; Gilin, V.G. et. al.* Experimental research of the heat transfer development along the pipe with the liquid metal flow under a transverse magnetic field in the case of the inhomogeneous heating (in Russian)// Thermal Engineering. 2007. No 3. P. 52—60.
- *Sinkevich, O.A.; Chikunov, S.E.; Isakaev, E.Kh.* Hydrodynamic and electric characteristics of plasmatrons under laminar and turbulent flow regimes. Journal of High Temperature Material Processes, An International Quarterly of High Technology Plasma Processes. 2007. Volume 11. Issue 1, pp 43—58.
- *Sinkevich, O.A.* Explosive disintegration of the steam film under the intensive heat flows (in Russian) // High Temperature. 2007. V. 45. No 2. P. 243—253.
- *Sinkevich, O.A.; Chikunov, S.E.; Isakaev, E.Kh.; Glazkov, V.V.* Space solar power stations: Problems of energy conversion and its use for the ecological purposes (in Russian). Proc. Conf. Results of fundamental research in power generation and their practical influence. Moscow. 2008. 24—26 March. Publication of United High Temperature Institute of RAS. P. 123—124.
- *Sinkevich, O.A.; Chikunov, S.E.; Isakaev, E.Kh.* Criterial generalization of the laminar and turbulent electric arc flows in long plasmatron channel. Proc. of the 10th High Temperature Plasma Processes Conf. Patras. Greece. 7—11 July. 2008. P. 66—69.
- *Gerasimov, D.N.; Astafieva, I.M.; Sinkevich, O.A.* Electron Beam Relaxation And Stable Distribution Functions. Ibidem. P. 90—93.
- *Sinkevich, O.A.; Chikunov, S.E.; Glazkov, V.V.* Processes in the two-phase layer nearby the heated ocean surface and the atmospheric vortexes generation (in Russian). Rep. 3-d Int. Conf. Heat and mass transfer in swirl flows. 2008. Moscow. 21—24 October. MPEI Publishing House. P. 93—94.
- *Sinkevich, O.A.; Potstepkin, V.M.; Poliakov, A.F.* Stability of the non-isothermal laminar flow in the flat channel (in Russian) // High Temperature. 2008. V. 46. No 3. P. 740—750.
- *Sinkevich, O.A.* Waves on the Surface of Vapor Film under Conditions of Intensive Heat Fluxes. Phys. Rev., E 78, N 036318 (2008).

Dissertations

- *Lavrikov A.V.* Experimental research of the aqueous solutions boiling under the increased pressure and improvement of a calculation approach for the boiling evaporators under the supercritical mineralization: Cand. Sci. (Techn.) Dissertation. 2008.
- *Borovskikh O.V.* Modeling of the heat-and-mass transfer processes in the hydrogen metal—hydride accumulators: Cand. Sci. (Techn.) Dissertation. 2008.

Partners

- «CATI» , Moscow.
- United Institute of High Temperature of RAS, Moscow.
- Russian Scientific Center «Kurchatov Institute», Moscow.
- The Federal State-Owned Unitary Enterprise "N.A. Dollezhal Research and Development Institute of Power Engineering"
- Moscow Aviation Institute, Moscow.
- Aviation A.N. Tupolev Scientific and Technical Complex
- "National Instruments", USA.
- «NPO Energomash named after academician V.P.Glushko», Khimky Moscow area.
- JSC «Proton — Permskie motori», Perm.
- Tokyo Science University.
- TURBOCON, Kaluga.
- OKB «GIDROPRESS», Podolsk.
- Aeroelectromash Open Joint-Stock Company, Moscow.
- IBRAE RAS, Moscow.

Unique equipment

- «Experimental mercury set-up for investigation of the liquid metals heat and mass transfer in magnetic field». This set-up is included to the list of unique set-ups of the Ministry of Science of RF
- «Automatically controlled experimental set-up for investigation of the turbulence structure».
- «Computerized complex for automatic control of the scientific experimental research».
- «Automatically controlled experimental set-up for investigation of the aqueous solutions boiling».
- ANES applied program complex for the numerical solution of non-stationary 3-D equations of heat and mass transfer (aero hydro-mechanics, heat and mass transfer).

ITNPE GENERAL PHYSICS AND NUCLEAR FUSION (GPNF) DEPARTMENT

Ph.: (495) 362-7865, E-mail: OFYS@mpei.ru

At GPNF Department:
50 teachers,
6 Ph. D. students.

Head of Department
Dr. Sci. (Techn.),
Professor Alexander T. KOMOV

Main lines of research

Research Supervisor

- **Experimental and theoretical research of interaction between the electrons and the light ions with the solid heterogeneous multi-component surfaces.**
  Professor Afanas'ev V.P.
- **Research of the substance properties with the optical-electronic methods.**
  Associated Professor Malakhov Y.I.
- **Experimental and theoretical research of a heat-mass exchange with extremely high density of energy in the phase transformation conditions.**
  Professors Komov A.T., Varava A.N.
- **Quantum electrodynamics and optics.**
  Professor Veklenko B.A., Associated-Professor Sherkunov Y.B.
- **Theoretical and experimental investigation of plasmatrons and plasma processes.**
  Professors Nguen K.S., Chinnov V.F.
- **Development of the computer technologies and their application into the teaching process and the laboratory training course.**
  Professor Sedov A.N.
- **The analytical theory of a self-dispersion for solids based on an invariant dispersion.**
  Associated-Professor Manukhin V.V.

Agreements, contracts, projects supported by the state budget

- The hydrodynamics and heat transfer of the two-phase flows in the small diameter channels in the intensive mass forces conditions.
- The theoretical and experimental research of a plasmic arc.
- The heat transfer and hydrodynamics in the intensive phase-changing processes.
- The measuring system for the two-phase flows research.
- The research of the regularities in the two-phase systems under forced motion conditions.
- The transfer processes in the two-phase system in a subcooled flow under critical heat loads.

Key publications

- *Afanas'ev, V.P.; Lubenchenko, A.V.; Norel, M.; Pavolotsky, A.* Study of Nb/Al interface combining spectroscopy of reflected electrons with ion sputtering. Journal of Physics: Conference Series 97 (2008) 012210
- *Afanas'ev, V.P.; Efremenko, S.; and Lubenchenko, A.V* Spectroscopy of Charged Particles Elastically Scattered by Plane-Parallel Solid Layers. Journal of Surface Investigation. X-ray, Synchrotron and Neutron Techniques, 2008, Vol. 2, No. 3, pp. 371—375

- *Afanas'ev, V.P.; Lubenchenko, V; and Pavolotskii, A.B.* AL/Nb Interface Study Based on the Analysis of the Energy Spectra of Reflected Electrons. Journal of Surface Investigation. X-ray, Synchrotron and Neutron Techniques, 2008, Vol. 2, No. 5, pp. 788—793.
- *Afanas'ev V.P., Efremenko,S; Lubenchenko, A.V.; M. Vos; and M. Went.* Inelastic cross-section of Nb for electron energy 5-40 keV. Book of abstracts «55 IUVSTA» workshop on electron transport parameters applied in surface analysis, p. 7, Siofok, Hungary
- *Afanas'ev V.P., Lubenchenko A.V., Efremenko D.S.* Spectroscopy of the charged particles elastically dispersed by the plain-parallel layers of a solid body (in Russian). Journal of Surface Investigation. X-ray, Synchrotron and Neutron Techniques. No 5. P 45—49.
- *Afanas'ev, V.P.; Lubenchenko, A.; Lukashevsky, M.; Norell, M., Pavolotsky, A.* Study of Al/Nb interface by spectroscopy of reflected electrons (in Russian). J. Appl. Phys. 2007.V. 101. P. 64912—64917
- *Veklenko, B.A.* Thermodynamics of a quantum electromagnetic field in the absorbing media (in Russian). Prikladnaya fizika. 2007, No 3, pp. 5—17.
- *Sherkunov, Y.* Casimir interaction between gas media of excited atoms. J. Physics D, Appl. Phys. 40, No 1 (2007), P. 86—94.
- *Sherkunov, Y.* Casimir-Polder interaction between an excited atoms and a gas dielectric medium. Phys. Rev. A. 75 (2007), P.12705—12717.
- *Veklenko, B.A.; Rukhadze, A.A.* About the quantum Nyqwist formula (in Russian). Lomonosov MSU Vestnik. Ser. 3. Physics. Astronomy. 2007, No 4, p. 3—7.
- *Sherkunov, Y.* Casimir-Polder interaction of excited media. Optics and spectroscopy, 103, p.388-392 (2007).
- *Veklenko, B.A.* Bozonni peak in the gaseous media (in Russian). Coll. of papers "Noise and degradation in semiconductor devices. MPEI Publishing House, 2007, p. 27—33.
- *Manukhin, V.V.* Self-dispersion of thin films (application of an invariant immersion method) (in Russian). Zhurnal tekhnicheskoi fiziki. 2007. Vol.77, issue 8, p. 6—12

Dissertations

- *Bocharov, G.S.* Cathode emission properties on the basis of the carbon nano-tubes: Cand. Sci. (Techn.) Dissertation. 2007.
- *Zakharov E.M.* Experimental research of the heat-exchange and hydrodynamics in the swirling flow under the one-sided heating: Cand. Sci. (Techn.) Dissertation. 2007
- *Lukashevskiy M.V.* Investigation of the solid micro- and nano-structures by the way of the reflected electron spectroscopy: Cand. Sci. (Techn.) Dissertation. 2007
- *Malakhovskiy S.A.* Heat-exchange at boiling under a forced stream of the swirling flow in the channels of a small diameter: Cand. Sci. (Techn.) Dissertation. 2008

Partners

- Moscow Institute of Engineering Physics (MIFI), Moscow
- Moscow Physical and Technical Institute (MFTI), Moscow
- Bauman Moscow State Technical University (Bauman MGTU), Moscow
- St. Petersburg State Technical University, Saint-Petersburg
- Russian Scientific Center «The Kurchatov Institute», Moscow
- Research Institute of Nuclear Physics of the Lomonosov Moscow State University (NIIYAF MGU), Moscow
- State Scientific Center «TRINITY», Troitsk, Russia

- «Institute of High Temperatures» Scientific Association, Russian Academy of Sciences (IVTAN), Moscow
- Efremov NIIEFA, Saint-Petersburg
- Joint Institute for Nuclear Research, Dubna, Moscow region.
- State Unitary Enterprise «The Dollezhal Research and Design Institute for Power Engineering» (FGUP NIIKIET), Moscow
- Joint Institute of Nuclear Investigations, Dubna
- Ioffe Physical and Technical Institute, Saint-Petersburg
- Analytical Center for Investigation of Surface Properties, Moscow
- Max Plank Institute, Germany

Unique equipment

- Test facility for Investigation of material properties using the spectroscopy of the reflected electrons
- Test desk for the secondary ion mass-spectrometry
- Spectral-photo-metrical experimental facility
- Experimental setup and arch DC plasmatron of 3—4 kW in power for investigation of the free plasma arch
- Test desk for investigation of the heat transfer crisis in the nuclear fusion beam receivers designed for operation at the high density of the energy
- The automatic data acquisition system on the base of KAMAK standard and MEK 625.1 instrument interface
- Experimental setup and the high-frequency inductive plasmotron with frequency 27 MHz, power 4—5 kW for investigation of an non-equilibrium plasma of the corpuscular and molecular gases

ITNPE HIGH TECHNOLOGY CENTER AND LOW TEMPERATURE (HTCLT) DEPARTMENT

Ph.: (495) 362-7556, (495) 362-7933,
fax: (495) 918-1469
E-mail: NT-all@mpei.ru,
NT@mpei.ru Scientific Supervisor of HTC,
Dr. Sci. (Techn.),
Professor, Corresp.Member of RAS
Winner of State Awards of USSR and RF
Head of LT Department
Evgeniy V. AMETISTOV
Director of HTC
Dr. Sci. (Techn.),
Professor,
Winner of State RF Award and RF
Government Award Alexander S. DMITRIEV

Main lines of research

Research Supervisor

- **Development of the radiation tiny space heat-exchangers**
  Professor Dmitriev A.C., leading researcher Bukharov A.V.
- **Nano-technologies: nano-electronics and nano-energetic**
  Professors Aleksenko A.G., Dmitriev A.S.
- **Development of the cryogenic corpuscular mono-disperse targets for the accelerating technology and nuclear fusion**
  Professor Dmitriev A.C., leading researcher Bukharov A.V.
- **Investigations of the heat processes in nano-structures**
  Professor Dmitriev A.C.
- **Research of the heat exchange and hydrodynamic in the cryogenic liquids in channels**
  Professor Klimenko A.V., senior researcher Sudarchikov A.M.
- **Investigation of the gas- and steam-dust mixtures in the non-equilibrium conditions**
  Professor Kriukov A.P.
- **Studying of the non-equilibrium transfer processes on the inter-phase surface gas-condensate including micro- and nano-structures**
  Professor Kriukov A.P.
- **High technologies in the vacuum engineering and the nano-technologies**
  Professor Nesterov S.B.
- **Investigations of the mixture thermal-dynamical properties and the low-temperature vapor-liquid cycles at operation on the mixtures**
  Associated-Professors Lunin A.I., Mogorychny V.I.
- **Investigations of the capillary instabilities of the drops and streams in the non-equilibrium conditions**
  Associated-professor Ginevskiy A.F.
- **Thermal-dynamic analysis and low-temperature installation development**
  Professor Brodyanskiy V.M.
- **Development of technology for the mono-disperse micro-spheres production from the rare-earth metals and alloys**
  Leading researcher Ankudinov V.B.

Agreements, contracts, projects supported by the state budget

- Investigations of the thermal-dynamical properties of the cryogenic mixtures

- Studying of a stream desintegration in the non-equilibrium conditions
- Investigations of the drop flows hydrodynamics and heat-exchange in vacuum
- Technology of the mono-disperse micro-spheres from the rare-earth metals and alloys
- Research and development in the area of the nano-emission electronics: a nano-emitter for creation of the ultra-bright energy-saving displays
- Research and development of the new cryogenic and refrigerating machines on the basis of the cryogenic mixtures
- Research of a heat transfer in nano-structures
- Studying of the non-equilibrium transfer processes on the inter-phase surface gas-condensate

Key publications

- *Kortsenshtein, N.M.; Samuilov, E.V.; Yastrebov, A.K.* Dynamics of a drop distribution function on sizes at the volume condensation in the case of a super-saturation creation at the finite speed (in Russian). // Reports of RAN. 2008. Vol. 423. No 5. P. 616—620.
- *Kortsensteyn, N.M.; Yastrebov, A.K.* Method of Direct Numerical Solution for Simulation of Supersaturated Vapor Condensation // Nucleation Theory and Applications. Dubna, JINR. 2008 P. 41—56.
- *Kortsensteyn, N.M.; Samuilov, E.V.; Yastrebov, A.K.* New Method for Simulation of the Aerosol Formation in the Process of Vapor Condensation // Transport Phenomena in Multiphase Systems. Balystok 2008. Vol. 2. P. 233—240.
- *Kortsensteyn, N.M.; Samuilov, E.V.; Yastrebov, A.K.* New Method for Simulation of the Heat-and-Mass exchange at condensation of over-saturated Vapor (in Russian). // Proc. of VI Minsk Intern. Forum on heat-and-mass exchange. Minsk: ITMO named after A.V. Lykov, 2008.
- *Kriukov, A.P.; Levashov, V.Yu.* Possible approaches to research of evaporation-condensation processes in the presence of non-condensing component (in Russian). // Ubidem.
- *Kortsensteyn N.M., Samuilov E.V., Yastrebov A.K.* New Method for Simulation of Heat and Mass Transfer at Supersaturated Vapor Condensation // Ibidem. Vol. 2. P. 54—55.
- *Kortsensteyn, N.M.; Samuilov, E.V.; Yastrebov, A.K.* New Method for Simulation of the Volume Condensation of Over-Saturated Vapor Aerosol Formation in the Process of Vapor Condensation (in Russian) // Proc. of XII Russian Conf. "Thermophysical properties of substances. Oct. 7—10, 2008. Moscow, 2008. P. 158.
- *Koroliov, P.V.* Growth of the heated vapor cavity in a capillary filled in by He-II at turbulent flow of the normal component and at vortex superfluid motion (in Russian). // Proc. of III Intern. Conf. "Heat-and-mass exchange in swirling flows". Oct. 21—23, 2008. MPEI Publishing House, 2008. P. 75—76.
- *Bukharov, A.V.; Dmitriev, A.S.; Semionov, A.A.* About the spontaneous curling modes at the capillary jet disintegration for the cryogenic liquids under the non-equilibrium conditions on its surfaces (in Russian). // Ibidem. P. 153—154.
- *Dmitriev, A.S.* On a description of the nano-liquid streams in the swirling nano-tubes and in the coreless nano-wires (in Russian). Ibidem. P. 157—158.
- *Dmitriev, A.S.; Mikhailova, A.S.* About the Quatte flow between the rotating cylinders with nano-gap in creeping on a wall mode (in Russian). // Ibidem. P. 159—160.
- *Koroliov, P.V.* Growth of a heated vapor cavity in a capillary filled in by He- II at turbulent flow of the normal component and at superfluid motion (in Russian). // Ibidem.

- *Dmitriev A.S.* Thermal conductivity of the composites of alignet nanoscale and microscale wires and nanotubes // J. Phys. 2008. No 6. P. 234—239.
- *Ametistov, E.V., Dmitriev, A.S.* Nano-energetic — the potential possibilities and prospects (in Russian). // Energoexpert. 2008. No 2 (7). P. 86—92.
- *Dmitriev, A.S. Timokhov, N.V.* About a computation of a phonon heat-conductivity of the semiconductor and dielectric nano-wires at the relaxation time approximation (in Russian). MPEI Vestnik. 2006. No 6. P. 125—133.
- *Dmitriev A.S., Shen S.* A phonon theory analysis on the heat transfer in nanoscale wires with radiation flow // Intern. J HMT. 2007. # 67. P. 435—438.
- *Dmitriev, A.S. Timokhov, N.V.* Heat resistance on the contact of the metal sample — non-metal nano-wire (in Russian) // Proc. of XIII Intern. Conf. of graduate and PhD students. March 1—2, 2007. MPEI Publishing House, 2007.
- *Dmitriev, A.S., Timokhov, N.V.* Knudsen heat-conductivity of the non-metal wires under the gaseous media condition (in Russian) // Ibidem.
- *Dmitriev, A.S.; Ikrin, A.A.* Investigation of the new methods of the thermal-electric cooling on the basis of the nano-structured materials (in Russian) // Proc. of XIV Intern. Conf. of graduate and PhD students. 2007. MPEI Publishing House, 2008. P. 49—50.
- *Kriukov, A.P.; Levashov, V.Yu.* Boundary conditions for a problem of an evaporating-condensation in the steam-gas mixtures (in Russian) // MPEI Vestnik. 2008. No 3. P. 24—30.
- *Kriukov, A.P.; Levashov, V.Yu.* Condensation on the plain surface from a steam-gas mixture (in Russian) // Teplofisika vysokikh temperatur. 2008. V. 46. No 3. P. 765—770.
- *Puzina Yu.Yu.* Vapor formation evolution on the surface of a semispherical heater at film boiling with underheating (in Russian) // Proc. of VI School-Seminar of young scientists of academician V.E. Alemasov «Problems of heat-and-mass exchange and hydrodynamics in power machinery». Kazan. KSU Publisher, 2008. P. 267—270.

Patents

- *Patent 2309832 RF.* Installation for surface cleaning /A.V. Bukharov; E.V. Ametistov, A.S. Dmitriev, 2007.

Dissertations

- *Sudarchikov, A.M.* Unstable modes of a flow at boiling in the channel: beginnings, characteristics, influence upon the heat-exchange and crisis: Dr. Sci. (Techn.) Dissertation. 2007.
- *Mednikov, A.F.* Motion of the multi-phase surfaces HeII — vapor in capillary and at boiling on the ball heaters: Cand. Sci. (Techn.) Dissertation. 2007.
- *Levashov, V.Yu.* Heat-and-mass transfer in the steam-gaseous mixtures with account of the non-equilibrium effects near the inter-phase surfaces: Cand. Sci. (Techn.) Dissertation. 2008.

Partners

- Association «Kholodbytmash», Moscow
- «Geliymash» company, Moscow
- «Kriogenmash» company, Moscow
- FGUP «Keldysh R&D center», Moscow
- FGUP «Institute of theoretical and experimental physics», Moscow
- Hantek Company, Taiwan
- HanShin company, Hongkong

- Russian scientific center «Kurchatov Institute», Moscow
- Dresden technical university, Germany
- «Edvard product department cryogenics Inc.», USA
- «IPD cryogenics Inc.», USA
- «Cryomach Inc.», USA
- «Sumitomo» company, Japan
- «Daikin» company, Japan
- Russian-Chinese technological park
- Research nuclear center Ulich, Germany

Unique equipment

- Cryo-center
- Thermal chamber for the refrigerating equipment testing
- Setup for the helium isotop film behavior studying
- Setup for the super-fluid helium research
- Setup for studying of the streams and drops of the various liquids in vacuum
- Setup for research and production of the metal mono-disperse micro-spheres
- Setup on the ultra-fast freezing
- Nano-technological equipment for education "NanoEducator"
- Equipment for education in the field of the nano-technologies "Nano Integra"

INSTITUTE OF PROBLEMS IN ENERGY EFFICIENCY (IPEE)

Institute Director

Dr. Sci. (Techn.), Professor,
Winner of State Award,
Winner of Russian Government Award, Corresponding Member of Russian Academy of Sciences
Alexander V. KLIMENKO
Ph.: (495) 362-7338, (495) 362-5633
Fax: (495) 673-3383
E-mail: ipeefdir3@mpei.ru
KlimenkoAV@admin.mpei.ac.ru

Departments and Divisions of Institute

INDUSTRIAL HEAT-AND-POWER ENGINEERING SYSTEMS DEPARTMENT (IHPES)

Ph.: (495)362-7553,
fax: (495) 362-7553,
E-mail: PTES-all@mpei.ru,
PTES@mpei.ru

At IHPES Department:
18 teachers,
3 researchers,
9 Ph.D. students.

Head of Department
Dr. Sci. (Techn.),
Winner of RF Government Award,
Professor Viacheslav A. RYZHENKOV

Main lines of research

Research Supervisor

- **Increasing of the energy effectiveness, reliability and exploitation resource of the thermal power equipment**
  Professor Ryzhenkov V.A.
- **Working out of the power supply independent complexes of the isolated consumers on the basis of use the geothermal resources.**
  Professor Ryzhenkov V.A.
- **Analysis, investigation and rationalization of the mutual producing heat and cold combined cycles. Efficiency increasing of the air and gas supply systems at enterprises. Analysis, research and rationalization of the detander-generating units schemes.**
  Associated-Professor Kalinin N.V.
- **Energy saving at the industrial products manufacturing (the high-efficient heat schemes, the heat-and-mass exchange intensification). Heat technological systems and complexes of the industrial and municipal enterprises.**
  Professor Shelginskiy A.Ya.
- **Physical models of an anisotropic turbulence. The non-traditional and renewable energy sources**
  Professor Motulevich V.P., Associated-Professor Motulevich A.V.
- **Reliability and exploitation effectiveness increase for the power engineering and pumping equipment**
  Professor Volkov A.V.
- **Hydrodynamical investigations of the dynamic pump settings, the exploitation reliability increasing methods development for the pumping equipment of the thermal power engineering objects**
  Professor Volkov A.V.
- **Development of the high-effective hydrodynamical recuperation systems using the redundant main pressure of the technological liquids**
  Professor Volkov A.V.
- **Heat transformer operation modes analysis (the heat pumps and the refrigerators)**
  Associated-Professor Martynov A.V.
- **Mathematical modeling and optimization of the energy-technological schemes of the metallurgical complex on the energy and ecology criteria**
  Professor Sultanguzin I.A., Senior Lecturer Khromchenkov V.G.
- **Estimation of influence on the environment in accordance with the Impact Pathway technique**
  Professor Sultanguzin I.A.

- **Energy audit and rationalization of the heat-and-energy supplying systems in the industrial enterprises. Application of the energy saving technologies.**

  Senior Lecturer Khromchenkov V.G., Associated-Professor Yavorovskiy Yu.V.
- **Calculation and optimization of the domain gas superfluous pressure recycling systems on the basis of the gas turbines.**

  Senior Lecturer Khromchenkov V.G.
- **Optimization of a construction, the heat schemes and the exploitation modes of the thermal power engineering installations, an implementation of the resource and energy saving technologies and equipment**

  Professor Kulichikhin V.V.
- **Analysis, research and rationalization of the steam supplying systems in the industrial enterprises.**

  Senior Lecturer Romanov V. I.
- **Working out and research of the micro-turbine drives and superchargers of various application.**

  Associated-Professor Katenev G.M.
- **Working out of the energy saving programs for the industrial enterprises and communal services.**

  Associated-Professor Borisov K.B.

Agreements, contracts, projects supported by the state budget

- Investigation of a formation process and a development of the approach to decrease the growth speed for the thermal-barrier deposits on the heat exchanging surfaces of the thermal power engineering equipment
- The analysis of a problem of the heat exchange processes intensification.

Key publications

- *Seleznev, L.I.; Ryzhenkov, V.A.* Erosive wear of the constructional materials (in Russian) // Technologiya metallov. 2007. No 3. P. 19—24.
- *Kachalin, G.V.; Ryzhenkov, V.A.; Ter-Arutjunov. B.G.; Mednikov, A.F.* Strengthening of elements locking and a regulating armature with use of the ionic-plasma technologies (in Russian) // Technologiya metallov. 2007. No 4. P. 19—21
- *Volkov, A.V.; Pankratov, S.N.* Questions of functioning of the feed-pumps on the thermal power engineering objects. (in Russian) // Nasosi&Oborudovanie. 2007. No 2. P. 34—37.
- *Sultanguzin, I.A.* Analysis of the burning processes of the heating gases in a coking plant (in Russian) // Koks i himiya. 2007. No 3. P. 11—20.
- *Working* out the common kinetic and diffusion models of burning of gases in a coking plant (in Russian) / Sultanguzin, I.A.; Konovalova, Yu.V.; Gabov, A.I.; Beljanichev, A.N.; Shkitko, S.K.; Jashin, A.P.; Gulmaliev, A.M. // Koks i himiya. 2007. No 4. P. 12—16.
- *Sultanguzin, I.A.; Jashin, A.P.; Isaev, M.V.* Impact analysis of the geometrical sizes of a coke-oven heating channel for a flame length (in Russian) // Koks i himiya. 2007. No 9. P. 19—22.
- *Sultanguzin, I.A.* Definition of a flame length and a way of agitation of gases in the heating channels of a coking plant (in Russian) // Koks i himiya. 2007. No 10. P. 19—27.
- *Ryzhenkov, V.A.; Sedlov, A.S.; Ryzhenkov, A.V.* Use of the surfactant species for decrease in the pipeline hydraulic resistance of a heat supply systems (in Russian).// MPEI Vestnik. 2008. .No 1. P. 41—47.

- *Working* out methods of an intensification of a heat transfer in matrix of the hot-water boilers and the heat-exchange equipment. (in Russian) / Volkov, A.V.; Petrikov, S.A.; Popov, V.S.; Hovanov, N.N. // Tiazhioloe mashinostroenie. 2008. No 10. P. 12—15.
- *Volkov, A.V.; Motulevich, V.P.; Chernyshev, S.A.; Petrikov, S.A.* Influence of a superficial heterogeneity on a heat exchange and a flow resistance in pipes of the heat exchangers (in Russian) // Energosberezhenie i vodopodgotovka. 2008. No 5. P. 55—57.

Patents

- *Patent MPK F01 K 21/04 27.02.2007.* Geothermal plant for the energy supply of consumers. / V.A. Ryzhenkov, A.V. Martynov, N.E. Kutko // BI. 2007.
- *Patent 62178 RF.* System for transmission of liquids in the pipeline systems. / V.A. Ryzhenkov, S.I. Pogorelov, A.V. Ryzhenkov // BI. 2007. No 10.
- *Patent 62218 RF.* Heat supplying system. / V.A. Ryzhenkov, S.I. Pogorelov, M.V. Lukin / / BI. 2007. No 9.
- *Patent 2330219 RF. MPK F24J 3/08.* Geothermal plant for the energy supply of consumers./ V.A. Ryzhenkov, A.V. Martynov, N.E. Kutko // BI. 2008.
- *Patent 73392 RF.* Geothermal heat exchanger for the energy supply of consumers. / V.A. Ryzhenkov, A.V. Martynov, N.E. Kutko, D.V. Hitrova // BI. 2008.
- *Patent 2318140 RF.* Directions for decrease in the hydraulic resistance of pipelines for transmission of the liquids./ V.A. Ryzhenkov, A.V. Volkov, S.I. Pogorelov, A.V. Ryzhenkov. // BI. 2008. No 6.

Dissertations

- *Yavorovsky Yu.V.* Effectiveness increase of the thermal power station on a metallurgical work using the combined-cycle plants. Cand. Sci. (Techn.) Dissertation. 2007.
- *Guchkov A.V.* Energy efficiency increasing of the air supply systems at enterprises by means of an optimum combination of the centralized and decentralized distribution. Cand. Sci. (Techn.) Dissertation. 2008.
- *Lukin M.V.* Exploitation efficiency increase of the heat supply system using the surface-active substances for the heat-exchange surface modification. Cand. Sci. (Techn.) Dissertation. 2008.

Partners

- The university "Ecole de mine de Paris" (France)
- JSC"Metallurgical industrial complex "Severstal"", Cherepovets
- Technical university of Berlin, Germany
- Technical university of Dresden, Germany
- University of Piza, Italy
- JSC «Mosenergo»
- United Energy Company of Moscow (MOEK)
- «Sigma», Czech Republic
- International committee on heat and mass exchange, Ankara, Turkey
- Institute of solar techniques, Rappersville, Switzerland
- Shubauer technological institute, Tokyo, Japan
- Scientific planning and production association «Ecotep» (Moscow)
- Armstrong International Inc., USA
- Turbine Plant, Kaluga

- Ministry of Municipal Economy of Moscow Region
- Scientific Center named after Keldysh
- Moscow Oil-Processing Plant
- Research-and-production enterprise "Teplotex", Ivanovo
- Memorial institute Battelle (USA)
- MBB Innotech GmbH

Unique equipment

- Test site for the thermal insulation efficiency determination.
- Dual-purpose heat pump
- Air liquefier
- Non-adiabatic vortex tube
- Reciprocating expander with the internal valve-actuating gear
- Complex of the portable instruments for carrying out the heat engineering measurement (including infrared)
- Test site for investigation of the formation process speed of the thermal-barrier deposits on the heat exchanging surfaces
- Test site with the hydro-dynamical recuperation system using the redundant main pressure of an technological liquid

IPEE HIGH-TEMPERATURE TECHNOLOGY POWER ENGINEERING (HTTPE) DEPARTMENT

Tel/fax: (495) 362-7125
E-mail: EVT-all@mpei; EVT@mpei.ru

On HTTPE Department:
13 Lecturers;
4 Researchers;
7 PhD-students.

Head of Department
Ph. D. (Techn.),
Professor Tatyana A. Stepanova

Basic areas of research

Research Managers

- **Intensive energy-saving in the thermal processes**
  Professors A.D. Klyuchnikov, T.A. Stepanova
- **Development of the thermal process systems for the energy-intensive industries (ferrous- and nonferrous metallurgy, production of construction materials, machine building, etc.)**
  Professors A.D. Klyuchnikov. I.P. Morozov;
  Associated- Professors S.K. Popov, V.N. Kuzmin
- **Development of the new-generation process equipment: the smelting chambers (furnaces) for the various processes, the high-temperature smelt/recovery and smelt/oxidation reactors, the heating- and thermal furnaces, the heat generators, the fuel burners, the components of regeneration- and external heat systems, the steam piston engines, the components of the small heat power plants**
  Professor T.A. Stepanova, Associated-Professor V.A. Ippolitov,
  Senior Researchers V.S. Dubinin, V.I. Volkov
- **Development of the energy- and material-saving, the environment-friendly method for treatment of the solid domestic waste, based on the intensive energy-saving concept**
  Professor T.A. Stepanova
- **Development of the energy-related fundamentals and algorithms to manage the industrial- and consumption wastes with account of the advanced, system-based resource- and energy-saving methods**
  Professor T.A. Stepanova
- **Development of the energy-related fundamentals and algorithms to manage the local fuel flows in the RF regions with account of the advanced, system-based energy-saving mathods**
  Professor T.A. Stepanova, Head of Research Lab V.A. Tumanovsky
- **Development, research and approbation of the new thermal principles to implement the technological processes; the structural and parametric optimization of the thermal patterns used for processing of the raw materials and for heating and thermal treatment of the sub-products and products**
  Head of Research Lab V.A. Tumanovsky
- **Development of the energy-saving thermal patterns and the energy-saving process equipment for production of the construction materials**
  Professor B.A. Sokolov, Associated-Professor V.N. Kuzmin
- **Development and use of the highly efficient liquid ceramic insulation in the thermal processes**
  Head of Research Lab V.A. Tumanovsky, Head of Training Lab A.I. Gusinsky
- **Energy audit of the industrial enterprises, definition of actions to improve the fuel energy balance of the enterprises and regions, saving of the fuel**

energy resources on the basis of the advanced energy-related upgrade of the thermal processes used for production of the cast iron, the steel, the nonferrous- and rare metals, the mill products, the cement, the glass, the ceramic products and the mineral fertilizers

Professor I.P. Morozov, Lead Researcher V.M. Smirnov

- **Development of the thermal neutralization (incineration) units to treat the wastes, including the highly toxic wastes**

  Professor T.A. Stepanova, Senior Researcher V.I. Volkov, Associated-Professors V.A. Ippolitov, I.M. Bernadiner
- **Certification- and other tests of the gas- and liquid fuel burners and other gas equipment**

  Professor I.P. Morozov, Lead Researcher V.M. Smirnov, Head of Research Lab V.A. Tumanovsky
- **Thermal reprocessing of the solid low-grade fuel (burning, gasification, pyrolysis, coking)**

  Professor A.A. Belyaev
- **Mathematic simulation of the thermal plants and systems**

  Associated-Professor S.K. Popov
- **Development of the processes and plants to derive the protective gases from the hydrocarbon materials**

  Senior Lecturer M.V. Kiselyova
- **Development of the process technologies and devices to obtain the water-fuel emulsions for environmental protection applications**

  Senior Researcher V.I. Volkov, M.A. Zasolotsky

Agreements, Contracts, and projects supported from the State Budget

- Development of the fundamental procedures to manage the energy-related efficiency of reprocessing of a local fuel in the Russian regions through use of the energy potential produced by the industrial-, countryside- and domestic wastes.
- Research and development works on generation of an engineering documentation and creation of the thermal reactor and systems to treat the flue gases produced in the course of incineration of the hazardous wastes.
- Development of the basic principles and methods to enhance an energy efficiency in the thermal technological processes in 2006-2008.
- Development of a source data for upgrading the aluminium fluoride drying / heat treatment furnaces to enhance the reliability and efficiency.
- Issue of the Terms of Reference for works under the project for refurbishment of some components of Ammofos VZ-45 TU-05furnace.

Basic Publications

- *Sokolov, B.A* Boiler plants and related operation (in Russian). Publishing Center Academiya, 2008, 428 p.
- *Sokolov, B.A.* Steam- and water boilers of low- and medium power (in Russian). Publishing Center Academiya, 2008, 126 p.
- *Popov, S.K.* Scope of application of an intensive energy-saving potential of the tunnel furnaces (in Russian) // MPEI Vestnik. 2007. No. 2. P. 57—62.
- *Krylov, A.N.; Popov,S.K.; Sergievsky, E.D.* Simulation of the heat- and mass exchange processes during the thermal chemical recovery of the heat of the exhaust gases (in Russian) // MPEI Vestnik. 2008. No. 6. P. 49—50.

- *Kiselyova, M.A.; Stepanova, T.A* Prospects of a replacement of a natural gas by the artificial fuel for the metallurgic furnaces (in Russian) // MPEI Vestnik. 2007. No. 2. P. 54—56.
- *Popov, S.K.; Stogov, P.A.* Theoretical minimum for an energy consumption in a thermal process used for production of the building bricks (in Russian) // Industrial Energy. 2007. No. 9. P. 31—34.
- *Popov, S.K.* Energy-saving potential in the glass-making furnaces (in Russian) // Industrial Energy. 2007. No. 6.
- *Klyuchnikov, A.D.; Petin, S.N.* Enhancement of an energy- and ecology efficiency of the large-scale hydrogen production through the integrated use of the natural gas in a ferrous metallurgy (in Russian). Proc. of Intern. Symp. on Hydrogen Energy, 1—2 November, 2007. MPEI Publishing House, 2007. P. 28—30.
- *Dubinin, V.S.* On comparison of the centralized power supply systems and the decentralized power supply systems in today's Russia (in Russian) // Industrial Energy. 2007. No. 1.
- *Dubinin, V.S.; Lavrukhin, K.M.; Komilitsin, S.R.; Titov, D.P.* On functioning of one of the DKVR-6,5-13 steam boilers in a boiler house independently of the electric power network (in Russian) // Industrial Energy. 2008. No. 3.
- *Comparative* assessment of the gas piston-, steam turbine- and steam piston electric power station (in Russian) // V.S. Dubinin, K.M. Lavrukhin, S.O. Shkapuro et al. // Industrial Energy. 2008. No. 8. P. 37—43.

Patents

- *Pat. 2298587 RF.* Method of reprocessing of the sulfide copper-bearing polydisperse materials / I.P. Morozov, M.Yu. Lopatin. 2007.
- *Pat. 2299766 RF.* Method of the bulk processing of the materials and related device / A.G. Shelepen, V.I. Volkov, M.A. Zasolotsky. 2007.
- *Pat. 64624 RF* (useful model). Hydrocarbon material pyrolysis device / A.D. Klyuchnikov, S.N. Petin. 2007.
- *Pat. 73330 RF.* Device for formation of a charge in the shaft process pre-chamber of a furnace with a perforated layer (variants) / Yu. K. Ivanov, S.K. Popov, A.K. Shamshin. 2008.
- *Pat. 2338985 RF.* Method of formation of a process chamber of a shaft furnace with a perforated layer of the charge material, and related device / Yu.K. Ivanov, S.K. Popov. 2008.
- *Certificate* of State Registration of Computer Software No. 2008610417. KILN software product for the thermal analysis of a tunnel furnace for the ceramic production / S.K. Popov // Registered in Computer Software Register on 23 January, 2008.
- *Certificate* of State Registration of Computer Software No. 2008610418. Analysis of a smelting chamber with a perforated layer of material / S.K. Popov // Registered in Computer Software Register on 23 January, 2008.

Theses

- *Kartavtsev S.V.* Development of a promising model of the energy- and material-saving thermal system for a ferrous metallurgy, based on the intensive energy-saving concept: Dr. Sci. (Techn.) Dissertation. 2007.
- *Lopatin, M.Yu.* Development of a promising model of the thermal system for crude copper production, based on the intensive energy-saving concept: Cand. of Sci, (Techn.) Dissertation. 2007.

Partners

- JSC Promgaz, Moscow;
- Industry Center of Implementations, RF Ministry of Transport Routes;
- Moscow Start-up Administration Energotekhmontazh, Russia;
- All-Russia Research Institute of Chemical Industry (VNIIKhT), Moscow;
- Research Institute of Fertilizers and Fungicides (NIUIF), Moscow;
- Scientific Production Association (NPO) Tekhenergokhimprom, Moscow;
- Moscow Aviation Institute (State Technical University);
- JSC Ammofos, Cherepovets;
- Production Association (PO) Spetsialnye Tekhnologii (Special Technologies), Ekaterinburg;
- International Academy of Science of Environment and Safety (MANEB), St. Petersburg.

Unique equipment

- Bench for the certification tests of the gas burners and other gas devices with heat power of 1 MW;
- Cyclone converter reactor, designed for the efficient implementation of the smelt-, smelt/oxidation- and smelt/recovery processes using the natural mineral materials and charges thermally processed in the high-temperature vortex gas suspension, in the smelt film and in the convector bath operated in the active hydrodynamic mode;
- Whirling bed reactor for a fire-aided neutralization of a wide range of the solid wastes and the pasty wastes;
- Cyclone reactor for a fire-aided neutralization of the toxic waste water and wastes containing the organic- and mineral substances;
- Gas chamber furnace for investigation of the heating and thermal treatment of the products and sub-products made of the metal, ceramics and other materials;
- Straight-line furnace with the variable emitting-flame characteristics and a process chamber geometry for investigation of the heat exchange and test of the special measurement aids, fitted with the automated scientific investigation system enabling to use the mathematical planning of experimental studies;
- Cyclone fire bench, designed for a fire-aided neutralization of the liquid industrial wastes and test of the new types of burners, including the industrial gas-oxygen burners;
- Straight-line vortex reactor with a boiling molten bath;
- 30 kW electric generator, with the Capstone (USA) gas turbine drive;
- Bench for investigation and test of the low-power (100 kW or less) gas- or liquid fuel boilers.

INDUSTRIAL ECONOMICS AND ENTERPRISE MANAGEMENT (IEEM) DEPARTMENT

Tel.: (495) 362-7751, (495) 362-7730,
Fax: (495) 362-7730,
E-mail: epop@mpei.ru, info@eco-mpei.ru

At IEEM Department:
44 teachers,
15 Ph.D. students.

Head of Department
Dr. Sci. (Techn.),
Professor Nikolay D. ROGALYOV

Main lines of research

Research Supervisor

- **Investigation of the organizational and economical aspects for development of the technologies for a hydrogen application in the power engineering**

  Professor Rogalyov N.D.
- **Development of the pricing mechanisms and tariff regulation on the retail markets of power and heat in view of an energy efficiency factor.**

  Professor Zubkova A.G., Associated-Professor Kurdiukova G.N.
- **Investigation of the methodological aspects of the power companies assets management**

  Associated-Professor Volkova I.O.
- **Development of the models and methods of the power companies investment activity strategic planning.**

  Professor Zubkova A.G.
- **Development of the organizational economic mechanisms of the industrial technologies transfer.**

  Professor Rogalyov N.D.
- **Development of the legal, organizational, economic mechanisms of involving of an intellectual property in the economic circulation**

  Professor Rogalyov N.D.

Agreements, contracts, projects supported by the state budget

- Development of the models and definition of parameters of the big capacity NPP with the hybrid power units using the hydrogen fuel.
- Development of the organizational tools of the technical university innovative potential.
- Thermal processes modelling, an optimisation of the circuit and constructive decisions for development of the new hydrogen technologies with reference to the modernized and under construction power stations

Key publications

- *Buchnev, O.A.; Rogalyov, N.D.* Fuel and energy complex: the problems of development and innovative activity organization (in Russian) // MPEI Publishing House. 2008. 36 p.
- *Power* economy. — the 2nd edition. // MPEI Publishing House. 2008.
- *Lisin, E.M.* Innovative platform model: the optimum program of the technology transfer participation financing. (in Russian) // Innovatsii. 2008. No 7. P. 109—113.
- *Brusnitsyn, A.N.* Development of the non-conventional energetic in the XXI century. (in Russian) // Power system. 2008. No 8. P. 2—11.

- *Rogalev, N.D.; Brusnitsyn, A.N.* To the question of an investment appeal of the hydrogen technologies introduction projects in the isolated power supply systems on traditional and renewed energy sources. (in Russian) // Innovatsii. 2007. No 10. P. 57—60.
- *Brusnitsyn, A.N.; Molodtsov, S.D.* The power policy in the developing countries of Asia. (in Russian) // Power Policy. 2007. No 4—5. P. 42—49.
- *Volkova, I.O.* Formation technique of electronetwork company investment projects portfolio on the basis of multi-purpose optimization. (in Russian)// Economy and management. 2008.
- *Volkova I.O.* Methodical questions of transport electronetwork companies industrial actives management. (in Russian) // Scientific and technical gazette of SPSPU. 2008
- *Volkova I.O.* The concept of construction of Russian electronetwork companies actives control system on benchmarking basis. (in Russian) // Scientific and technical gazette of SPSPU. 2008. No.2, P. 101—108.
- *Volkova I.O.* The analysis of the electronetwork companies actives management models. (in Russian) // Scientific and technical gazette of SPSPU. 2007. No. 3, P. 162—167.
- *Volkova, I.O.; Varlashkin, K.V.* Methodical aspects of the electronetwork companies efficiency actives management estimation. (in Russian) // Economic sciences. 2007. No. 10. P. 172—177.
- *Volkova, I.O.; Samarenko, O.V.; Sof'in, V.V.* Network actives control system: the new approach to management in the electronetwork companies. (in Russian) // The power expert. 2008. No.2. P. 20—26
- *Volkova, I.O.; Maslov, A.V.; Frolov, K.E.* The analysis of world experience in the area of construction of the electronetwork companies actives control systems. (in Russian) // Power market. 2007. No. 8
- *Lisin, E.M.* The linear determined model of the technology transfer participation financing. Integrated criteria of an efficiency. (in Russian) // Proc. of IX All-Russia conf. of young researchers «Molodiozh, Obrazovanie, Economika»: «Remder» Publisher, 2008. P. 515—520.
- *Lisin, E.M.* Innovative platform: a model of the technology transfer participation financing. (in Russian) // Youth and science: the XXI-st century beginning: Proc. of All-Russia conf. of young researchers. 2008. P. 285—288.
- *Bunak, I.V.* Creation of mechanisms of the investment project participants stimulation to economy of the resources within the limits of the engineering activity design management in nuclear engineering. (in Russian) // Proc. Of All-Russia conf. «Management and economy in modern systems» 21.03.2008. Volgograd. «Globus» Publisher. 2008. P. 72—75.
- *Aleksandrov, A.V.; Lisin, E.M.* Features of the feasibility report on investments into the power objects on an example of building the 78 megawatt combined-cycle power plant for the Moscow region. (in Russian) // Proc. of IV All-Russia school-seminar of young researchers «Energy saving — theory and practice»: MPEI Publishing House, 2008. P. 313—314.
- *Zubkova, A.G.; Shuvalova, D.G.; Terentyev, D.M.* Process and regulations of the thermal energy tariffs establishment. (in Russian) // Ibidem. P. 315—318.
- *Kosorotov, V.A.; Zubkova, A.G.* The authentic commercial account of the transported and consumed electric power by the network and marketing companies is one of the economic mechanisms of the state policy in the field of energy savings realization. (in Russian) // Ibidem. P. 325—330.
- *Nikitina, A.A.; Kurdiukova, G.N.; Stepanova T.A.* Substantiation of the building of a factory on firm household waste processing and cement reception. (in Russian) // Ibidem. P. 331—335.

- *Kosorotov, V.A.* System engineering of the expenses account at formation of a gain from the electric energy realization and expenses by the transfer of an electric energy by the electric networks. (in Russian) // XIV Interregional Conf. of young researchers of Economic specialities «Problems of modern economy» 25.04.2008. Krasnoyarsk. The Siberian federal university.
- *Zubkova, A.G.; Shuvalova, D.G.; Terent'ev, D.M.* Process and the regulations of tariffs for the thermal energy establishment. Problems and prospects. (in Russian)»Power — 2008: Innovations, decisions, prospects»; 15-19.09.2008. Kazan. Kazan state power university.
- *Kosorotov, V.A.* Commercial account of the electric energy technological losses by the electronetwork company. (in Russian) // Ibidem.
- *Korneeva, E.A.* Problem of a choice of a regional power consumption forecasting method. (in Russian) // Ibidem.
- *Volkova, I.O.; Varlashkin, K.V.* Management of actives efficiency as a part of the electropower companies quality control system. (in Russian) // Quality management: the theory, methodology, practice. Proc. Of All-Russia conf. 11.12.2007. Saransk. P. 168—171.
- *Kulik, R.V.* Application of the indistinct logic principles in the systems of strategic planning on the basis of Balanced Score Cards methodology. (in Russian) // Journal of post-graduate students and doctoral candidates scientific publications. 2008. No. 12
- *Kulik, R.V.* Practical application of the indistinct logic principles at the administrative decision acceptance (on an example of the KPI strategic indicators development). (in Russian) // Ibidem.
- *Tikhomirova, O.V.; Vinogradov, I.V.* Regulation in the electric power industry from the point of view of a customer-oriented approach and protection of the regional network company economic interests. (in Russian) // Power market. 2007. No. 8
- *Tikhomirova, O.V.; Vinogradov, I.V.* The mechanism of a differentiation of the tariffs for transfer on the groups of consumers. (in Russian) // Electro. 2007 No. 4
- *Negomedzyanova, E.A.; Zubkova, A.G.* Formation of the generating company economic efficiency estimation model. (in Russian) // Journal of post-graduate students and doctoral candidates scientific publications. 2007. No. 6. P. 3—7.
- *Negomedzyanova, E.A.; Zubkova, A.G.; Dementyev, D.V.* Adaptation of an investment appeal estimation technique to the operating conditions of the wholesale generating company. (in Russian)// Russian economic Internet magazine. Internet magazine of academy of work and social relations. 2007. http://www.e-rej.ru/Articles/2007/ Negometzyanova_ Dementyev.pdf
- *Rogalyov, N.D.; Zubkova, A.G.; Negomedzyanova, E.A.* Investment activity as the tool of the generating company cost management. (in Russian) // Innovation. 2007. No. 7 P. 107—111.
- *Rogalyov, N.D.; Zubkova, A.G.; Frey, D.A.* Planning of the thermal power station production program in the conditions of development of the competitive relations in a power markets. (in Russian) // Innovation. 2007. No. 1 P. 77—81.
- *Rogalyov, N.D.; Arutyunyan, A.A.* Classification of risks and risk factors for the generating companies. (in Russian) // MPEI Vestnik. 2007. No. 4. P. 53—59.
- *Rogalyov, N.D.; Brusnitsyn, A.N.* The analysis of installations with the renewed energy sources electric power cost price (in Russian). // MPEI Vestnik. 2007. No. 5. P. 109—113.
- *Tyurin, A.V.; Bronz, P.V.; Grigoryan, A.L.* Probabalistic model of the economic efficiency and risks of the power stations investment projects estimation. (in Russian) // Controlling. 2007. Bauman MSTU. 2007. P. 45—54.

- *Voshinin, A.P.; Grigoryan, A.L.* Estimation of the nuclear power station investment projects economic efficiency under the inexact data. (in Russian) // Proc. of Rosatom of an innovative forum. Rosatom Publisher. 2007. P. 98—105.
- *Negomedzyanova, E.A.; Zubkova, A.G.* Distribution of the investment program financing sources (in Russian). // Proc. of VIII All-Russia conf. of young researchers «Molodiozh, Obrazovanie, Economika». Yaroslavl'. 2007.
- *Milykh, M.V.* Formation of a regional innovative system. (in Russian) // Ibidem.
- *Pronina, O.S.* Costs planning methods on manufacture/development of the new power equipment on an example of the condensation turbines. (in Russian) // Ibidem.
- *Brusnitsyn, A.N.* Estimation of the factors influencing on an economic efficiency of introduction of the electric power hydrogen technologies in the isolated power supply systems on the renewed energy sources. (in Russian) // Ibidem.
- *Shulikina, E.V.* Estimation of the small-scale business enterprise innovative potential. // Ibidem.
- *Kharisova, A.I.* Optimisation of the import taxation: a method of the maximum course differences for the profit tax minimization. (in Russian) // Ibidem.
- *Terentyev, D.M.* The tariff policy of an industrial enterprise. The state influence. (in Russian) // Ibidem.
- *Osipova, U.S.* The tactical analysis of the electromagnetic actuator market with use of the econometric methods. (in Russian) // Ibidem.
- *Novikov, A.D.* Potential participants of the municipal power system reforming. (in Russian) // Ibidem.
- *Novikov, A.D.* Attraction of investments into the municipal power and tariff regulation. (in Russian) // Ibidem.
- *Nikolayeva, M.A.* Marketing research of the market of monitoring and management of access on the territory systems. (in Russian) // Ibidem.
- *Lisin, E.M.* Technological transfer as a control process of the new technique creation and development. (in Russian) // Ibidem.
- *Koveshnikova, U.V.* Perfection of the enterprise personnel maintenance technique. (in Russian) // Ibidem.
- *Shuvalova, D.G.* Estimation of a structure of the electric power industry branch market in reforming and in the long term. (in Russian) // Ibidem.
- *Solomatova, M.V.* Technique of selection of the technical college research and development results for the subsequent commercialization (in Russian). // INNOVATIKA—2007: All-Russia conf. Ul'ianovsk. 2007. P. 91—93.
- *Voshinin, A.P.; Grigoryan, A.L.* Estimation of the nuclear power station investment project economic efficiency under the inexact data. (in Russian) // Proc. of Rosatom of an innovative forum. Rosatom Publisher. 2007. P. 98—105.
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- *Rogalyov, N.D.; Shuvalova, D.G.* Estimation of a structure of the electric power industry branch market in reforming and in the long term. (in Russian) // Ibidem. P. 93—97.
- *Vashenko, V.P.; Lisin E.M.* Video-conference systems application for the remote formation problem solving. (in Russian) // Proc. of Scientifically-education conf. «Bilateral scientifically-educational cooperation of high schools of Russia and Universities of the Peoples Republic of China in the field of scientific and pedagogical workers preparation and young experts training». 2007. P. 12—15

- *Rogalyov, N.D., Agababov, V.S.; Brusnitsyn, A.N.; Arharova, A.U.* Hydrogen technologies in the main gas-transport systems. (in Russian) // The 2nd international symp. on hydrogen energy. MPEI Publishing House. 2007. P 197—201.
- *Brusnitsyn, A.N.* Prospects of increasing of the isolated power supply systems economic efficiency by introduction of the hydrogen technologies. (in Russian) // Ibidem. P. 235—238

Dissertations

- *Solomatova M.V.* Development of the legal, organizational and economic mechanisms of the technical college intellectual property management: Cand. Sci. (Econ.) Dissertation. 2007
- *Negomedzyanova E.A.* Development of the models and methods of the generating company investment activity strategic planning: Cand. Sci. (Econ.) Dissertation. 2007
- *Tihomirova O.V.* Methodical maintenance of a system of the regional electro-network companies tariff regulation on the basis of a customer-oriented approach: Cand. Sci. (Econ.) Dissertation. 2007
- *Frey D.A.* Development of methodical maintenance of the thermal power station industrial-economic activities planning system in the conditions of the competitive relations in a power markets development: Cand. Sci. (Econ.) Dissertation. 2007
- *Lisin, E.M.* Perfection of the organizational and financial mechanism of the industrial technologies transfer: Cand. Sci. (Econ.) Dissertation. 2008

Patents

- *Patent No 65627 RF.* Geothermal power station of the isolated power supply system. / V.S. Abramov V.A., Rogalev N.D., Brusnitsyn A.N. // BI. 2007
- *Patent No.69212 RF F24J 3/08.* Geothermal power station of the isolated power supply system with the combined fuel. / V.S. Abramov V.A., Rogalev N.D., Brusnitsyn A.N. / / BI. 2007
- *Patent No.68073 RF F02G 1/04, F40D25/00, F25B11/00, F01K23/00, F02C7/36.* Gas supply system. / Agababov V.S., Rogalev N.D., Arharova A.U., Brusnitsyn A.N. // BI. 2007 No. 31
- *Patent No. 2335641 C2 (F01K 3/18, G21D 5/16).* The way of increase of the two-planimetric nuclear station efficiency and capacity. / Zaryankin A.E., Arianov S.V., Zaryankin V.A., Rogalev N.D. // BI.2008. No. 28

Partners

- «NIIgazekonomika» company, Moscow
- MPEI Science Park, Moscow
- «ESKOTEK» company, Moscow
- Moscow machine-building industrial enterprise«Salut», Moscow
- «INVEL» company, Moscow
- Russian-Chinese Technopark «Druzhba», Moscow
- «ENTEK» company, Moscow

IPEE HEAT-AND-MASS TRANSFER PROCESSES AND FACILITIES (HMTPF) DEPARTMENT

Ph.: (495) 362-7149,
E-mail: TMPU.all@mpei.ru

At HMTPF:
23 teachers,
19 Ph.D. students.

Head of Department
Ph. D. (Techn.),
Professor Andrey B. GARYAEV

Main lines of research

Research Supervisor

- **The stationary and non-stationary two-phase heat exchange and hydrodynamics. The heat exchange at the liquid film boiling**

  Professor Pavlov Yu.M.

- **The numerical modeling of the non-stationary hydrodynamic processes of a heat exchange in the turbulent flow of incompressible and compressible fluid in the channels. The modeling of the turbulent transfer of momentum, heat and mass in the free thermo-concentration convection.**

  Professor Valueva E.P.

- **The mathematical modeling, calculation and experimental research of the characteristics of a turbulent heat exchange and a friction in the elements of the technical devices.**

  Professor Sergievskiy E.D.

- **Transport processes research in the industrial apparatuses with the physical and chemical transformations and spreading of the admixtures in the atmosphere.**

  Professor Garyaev A.B.

- **Development, investigations and modeling elements of the systems for heat conditions of the autonomous objects and an artificial climate equipment.**

  Professor Efimov A.L.

- **Development, investigation and modeling elements of heat regime provided systems for the autonomous objects and the artificial climate installations**

  Professor Sasin V.Ya.

- **Development and investigation of the power supply systems based on the expansion-generator engines.**

  Professor Agababov V.S.

Agreements, contracts, projects supported by the state budget

- Development of the methodology of the thermal image sensor survey of the electrical equipment in the residential, public and office buildings
- Development of a numeral model and the settlement study of refrigeration of the components of the low power equipment.
- Development of the computational model and a calculation research of the refrigeration systems of elements of the low power equipment.
- Development and design of the heat energy utilizer for a heat power of the leaving gases from a clinker furnace.
- Development of the manual to the lecture course «Energy saving in the heat power engineering and the heat power technologies».

- Investigation of the steam condensation from a gas-vapor mixture in the thermo-using arrangement and the heat-exchangers by the deep heat utilization in the leaving gases.
- Modeling and development of the methods for a numerical simulation of the circulating heating of the black oil in a large tank capacity.
- Experimental investigations in the field of the heat exchange intensification in the laminar flows of the viscous fluids in the industrial heat-exchangers.
- Investigation of a heat transfer in a laminar flow of the viscous Newtonian fluids in the profile-screw channels.
- Physical modeling of a liquid burn-out crisis in channels in the field of the high reduced pressures
- Physical modeling of a boiling liquid crisis in channels in the field of high pressures

Key publications

- *Valueva, E.P.* Integral methods of a heat-emission calculation at the turbulent liquid flow with the variable properties. Stationary and quasi-stationary flows in the round tube at constant density of the heat stream on a wall (in Russian) // TVT. 2007. Vol. 45. No 7. P. 56—65.
- *Valueva, E.P.* Integral methods of a heat-emission calculation at the turbulent liquid flow with the variable properties. Stationary and quasi-stationary flows in the round tube at the constant wall temperature (in Russian) // TVT. 2007. Vol. 45. No 3. P. 384—391.
- *Valueva, E.P.* Integral methods of a heat-emission calculation at turbulent liquid flow with variable properties. The pulsed high-frequency flow (in Russian) // TVT. 2007. V. 45. No 4. P. 557—564.
- *Valueva. E.P.* Pulsed turbulent flow in tubes. Part 2. Flow under condition of the liquid compressibility presence (in Russian) // MPEI Vestnik. 2007. No 2. P. 16—23.
- *Agababov, V.S.; Dzhuraeva, E.V.; Arkharova, A.Yu.* Installation for the electrical energy production on the basis of a detander-generator aggregate (DGA), the air turbines and a compressor (in Russian) // MPEI Vestnik, 2007. No 2. P. 48—53.
- *Zur analitischen* Berechnung des optimalen Ausgangdruckes bei Streckenverdichtern fuer den Gastransport / V.S. Agababov, A.V. Korjgin, J. Mischner, R.J. Frolov, F. Foerster, B. Kraft // Gas-Erdgas gwf-148 (2007). Nr. 7—8. S. 434—442.
- *Unfuel* power engineering installation including the detander-generator aggregate, a air compressor and an air turbine (in Russian) / V.SD. Agababov, J. Mishner, E.V. Dzhuraeva, E.S. Solov'iova, S.V. Kamenskiy // Energocberezhenie i vodopodgonovka. 2007. No 6.
- *Agababov, V.S.; Koriakin, A.V.* Application of the detander-generator aggregates for use the technological pressure drop of the transported natural gas (in Russian) // The modern environmentally friendly technologies in the electrical power engineering: Information collection / Under edition of Putilov V.Ya. MPEI Publishing House, 2007. 388 p.
- *Sergievskij E.D.* Mathematical model of filtered isolation in high-temperature furnace with oriented injection of the cooler / Advanced Combustion and Aerothermal Technologies // Spriger. 2007. P. 211—218.
- *Garyaev, A.B.* Peculiarities of an installation calculation for utilization of the humid gas heat (in Russian) // Energocberezhenie i vodopodgonovka. 2007. No 4. P. 35—38.

Patents

- *Patent 43345 RF. МПК F 25 B 11/02.* Detander-generator installation / V.S. Agababov, A.Yu. Arkharova, Yu.M. Arkharov, A.V. Koriagin // BI. 2005. No 1.
- *Patent 43630 RF. МПК F 25 B 11/02.* Detander-generator installation / V.S. Agababov, A.Yu. Arkharova, A.R. Andreev et al. // BI. 2005. No 3.

- *Patent 49199 RF. МПК F 25 B 11/02, F 01 K 27/00.* Detander-generator installation / V.S. Agababov, A.Yu. Arkharova, Yu.M. Arkharov. // BI. 2005. No 31.
- *Patent 46565 RF. МПК F 25 B 11/02, F 01 K 27/00.* Installation for obtaining the electrical power, heat and cold / V.S. Agababov, A.Yu. Arkharova, N.V. Malafeeva B.C. // BI. 2005. No 19.
- *Patent 57433 RF. МПК F 25 B 11/02, F 01 K 27/00.* Detander-generator installation / V.S. Agababov, A.Yu. Arkharova, Yu.M. Arkharov et al. // BI. 2006. No 28.
- *Patent 57434 RF. МПК F 25 B 11/02, F 01 K 27/00.* Detander-generator installation / V.S. Agababov, A.Yu. Arkharova, Yu.M. Arkharov et al. // BI. 2006. No 28.
- *Patent 73461 RF. МПК F 28 F 1/10.* Heat-exchange tube / E.D. Sergievskiy, A.N. Krylov, A.S. Vlasenko // BI. 2008. No14.
- *Patent 73462 RF. МПК F 28 G 13/00.* Heat-exchanger / A.B. Garyaev, A.N. Krylov, E.D. Sergievskiy // BI. 2008. No 14.

Dissertations

- *Krylov A.N.* Effectiveness increase of the glass-worked furnaces on the basis of combined regeneration of the heat waste products: Cand. Sci. (Techn.) Dissertation. 2007.
- *Miroshnichenko L.O.* Influence of the external conditions and the internal factors of the protected object upon the operation of jet blocking: Cand. Sci. (Techn.) Dissertation. 2007.
- *Andreev A.R.* Application of detander-generator technologies as a way to effectiveness increase of a boiler-house operation: Cand. Sci. (Techn.) Dissertation. 2007.
- *Musin I,R.* Energy and resource savings by means of the heat and hydrodynamic effectiveness increase of the lamellate heat exchangers of band-in-line type: Cand. Sci. (Techn.) Dissertation. 2007.
- *Synkov I.V.* Influence of an air flow turbulence and irregularity upon the heat-hydraulic characteristics of the heat exchangers for the air conditioning systems: Cand. Sci. (Techn.) Dissertation. 2007.
- *Fediaev A.A.* Development and scientific substantiation of the heat-engineering approaches and technical solutions to increase the energy effectiveness of the heat engineering equipment: Dr. Sci. (Techn.) Dissertation. 2008.
- *Taktashiov R.N.* Development and scientific substantiation of the heat-engineering approaches and technical solutions to increase energy effectiveness of the heat engineering equipment: Cand. Sci. (Techn.) Dissertation. 2008.
- *Garyaev A.A.* Application of detander-generator aggregates for effectiveness and reliability improvement of the compressor stations in the system of gas transporting: Cand. Sci. (Techn.) Dissertation. 2008.

Partners

- Kazan Research Center of RAS (Research Center of Energy problems)
- JSC Veza — leading Russian enterprise in the field of development, manufacture and distribution of climate technologies
- R&B Association Termek

Unique equipment

- Measuring complexes for an automated data acquisition in the process of the thermophysical investigations of International Instruments Company
- Climatic chamber of the thermal-and-moisture treatment of air for testing the refrigeration-and-drying units

IPEE CHEMISTRY AND ELECTROCHEMICAL POWER ENGINEERING (CEPE) DEPARTMENT

Ph./fax: (495) 362-7694,
Ph.: (495) 362-7519, (495) 673-0278,
E-mail: KuleshovNV@mpei.ru

At CEPE Department:
20 teachers,
4 researchers,
8 engineers,
7 Ph.D. students.

Head of Department
Dr. Sci. (Techn.),
Professor Nikolay V. KULESHOV

■ Main lines of research

Research Supervisor

- **Investigations and development of the electrolytic cells, the fuel cells with alkaline and hard-polymer electrolyte**
  Professor Kuleshov N.V.
- **Development of the portable fuel elements**
  Professor Korovin N.V.
- **Development of power installations on the basis of the high-temperature hard-electrolyte fuel cells**
  Professor Korovin N.V., Associated-Professor Slavnov Yu.A.
- **Development of the lithium current sources with a polymer electrolyte**
  Leading researcher Smirnov S.E.
- **System analysis and optimization of the electrochemical power installations**
  Professor Nesterov B.P.
- **Development of the electrolytic cells of the filing stations for the gasoline-hydrogen cars**
  Leading researcher Nefiodkin S.I.
- **Investigations of the bio-fuel cells**
  Associated-Professor Osina M.A.
- **Nano-technologies in the fuel cells**
  Associated-Professor Yashtulov N.A.

■ Agreements, contracts, projects supported by the state budget

- Research and development of technologies for creation of the element basis and the membrane-electrode units of new generation for the low-temperature water electrolytic cells and the fuel elements
- Research and development of the high-efficient electrolytic systems with a hard-polymer electrolyte for the hydrogen energetic
- Conceptual project creation for a hybrid energy installation on the basis of the high-temperature fuel cells
- Lithium accumulator on the basis of the nano-structured elements
- Development of the pilot and manufacturing base preparation for an alkaline hydrogen generator of new generation
- Creation of the structured composite materials-electrocatalysts on the basis of the ferments for the bio-fuel cells

- Maintenance and support of the joint usage center «Hydrogen energetic and electrochemical technologies» by a research equipment to execute the researches on the basis of the priority directions
- Development of a reversible fuel element (contract within the limits Vi-th frame program of the European Union)

Key publications

- *Kuleshov, N.V.; Grigoriev, S.A.* Catalytic composition and a fuel content influence upon the characteristics of the anode processes in the fuel elements with a hard-polymer electrolyte (in Russian) // Elektrokhimicheskaya energitika. 2008. V. 8. No 1. P. 33—40.
- *Smirnov, S.S.; Zhorin, V.A.* Influence of mechanical activation upon a synthesis and the electrochemical properties of a lithium-vanadium bronze (in Russian) // Zhurnal prikladnoi khimii. 2008. V. 81. No 8. P. 1398—1400.
- *Chebotariov, V.P.; Putsylov, I.A., Smirnov, S.S.* Investigation of a polymer electrolyte on the basis of an aromatic polysulphones (in Russian) // Plasticheskie massy. 2008. No 1. P. 44—46.
- *Zhorin, V.A.; Kiseliov, M.R.; Smirnov, S.E.* Plastic straining influence under high pressure upon the thermal processes in the mixtures of some vanadium oxides with LIOH and LI2CO3 (in Russian) // Doklady RAN. 2008. V. 422. No 1. P. 1—3.
- *Korovin, N.V.; Burov, V.D.; Sedlov, A.S.; Slavnov, Yu.A.* Calculation of the hybrid electrical station efficiency for a high-temperature fuel element (in Russian) // Teploenergetika. 2007. No 2. P. 49—53.
- *Klimenko, A.V.; Kuleshov, N.V.; Korovin, N.V.; Fateev, V.N.* Scientific investigations and expert's training in the field of hydrogen energetic in the MPEI Institute of Problems in Energy Efficiency (in Russian) // Proc. of II Intern. Forum "Hydrogen technologies for the developing world", April 22—23, 2008. Russia, President-Hotel. Moscow. P. 128—130.

Patents

- *Patent 2322460 (RF).* Method of a membrane production for the electrolytic water decomposition / N.V. Kuleshov; A.A. Terent'ev, V.N. Kuleshov.

Dissertations

- *Smirnov, S.S.* Research and development of the hard-phase lithium rechargeable cell with cathode on the basis of the lithiumed vanadium oxide: Dr. Sci. (Techn.) Dissertation. 2008.
- *Putsilov I.A.* Research and development of the hard-phase of the lithium-manganese-dioxide element: Cand. Sci. (Techn.) Dissertation. 2008.

Partners

- "Kurchatov Institute" Russian Scientific Center, Moscow
- Institute of High Temperatures RAS, Moscow
- Institute of Chemical Physics and Electrochemistry, Russian Academy of Sciences (IKhF RAS), Moscow
- ENERGIA company, Elets city
- R&D Association KVANT, Moscow
- National Association of hydrogen energetic of Russia, Moscow
- URALKHIMMASH company, Yekaterinburg

- Al'tern scientific-and-production association (NPO Al'tern), Elektrougli, Moscow
- «Hydrogenics Corporation», Belgium

Unique equipment

- Joint MPEI Center "Hydrogen Energetic and Electrochemical Technologies"
- Wide-band potentiostate-galvanostate SOLARTRON SI1287, UK and PARSTAT 2273 (USA)
- Testing Bench for the fuel cell tests FAST G-60, Canada
- Gas chromatograph Varian C3-4900
- Raster electronic microscope with energy-dispersion analysis Jeol JSM-6380LA (Japan)
- Pore meter Porotech (Canada)
- Electrochemical generator with a system for hydrogen storage in compressed and metal-hydride kind and an automated system for diagnostic and safety ensuring of the hydrogen technology elements from the distant access with the educational functions (Italy)

SCIENTIFIC AND TECHNICAL INNOVATION CENTER OF ENERGY SAVING TECHNOLOGIES AND EQUIPMENT (STIC ESTE)

Ph.: (495) 362-7103, (495) 673-5071,
fax: (495) 918-1371,
E-mail: admin@stic-eett.ru; ITEM@mpei.ru

At STIC ESTE:
16 researchers,
17 engineers.

Center Director
Ph. D. (Techn.), Associated-Professor
Anatoly G. VAKULKO

Main lines of research

Research Supervisor

- **Information technologies**
- **Methodology of energy inspections**
- **Scientific-methodical problems of energy efficiency**
- **Agreements, contracts, projects supported by the state budget**
- **Development of a methodic and information support of a monitoring system for acquisition, processing and aggregation of the report statistical data presented by the educational institutions**
- **Development of scientific-methodical support of the information security systems for the information-analytical financing system of the educational and research institutions**
- **Development of software for a data export/import between the information systems of the main manager of budget finance and the Ministry of Finance of Russian Federation**
- **Development of information support of a monitoring system for bonus payment of the talented youth support**
- **Development of information system for actualization and the total list conducting of the institutions within the jurisdiction of the Russian Ministry of Education.**

Key publication

- *Creation* and support of the problem-oriented data base for energy-saving actions for the budget institutions (in Russian) / A.V. Klimenko, A.G. Vakulko. A.V. Bobriakov et al. / / Energosberezhenie i vodopodgotvka. 2007. No 5. C. 4—6.
- *Energy* certification of the budget institutions (in Russian) / A.G. Vakulko, A.V. Bobriakov, A.S. Vorob'iov, O.L. Danilov // Energeticheskaya politika. 2007. No 4—5. P. 57—60.
- *Bobriakov, A.V.* Strategies of the administrative-technological management by the processes of an energy consumption and an energy saving in the budget branches of economy (in Russian) // Energosberezhenie i vodopodgotvka. 2007. No 3. P. 26—29.
- *Bobriakov, A.V.* Information support of the management processes for an energy consumption and energy saving in the budget branches of economy (in Russian) // Proc. of IV Intern. School-seminar of young researchers "Energy saving: theory and practice". Moscow. MPEI Publishing House. 2008. P. 17—23.
- *Approaches* to organization of the information security system (in Russian) / A.G. Vakulko, A.G. Stefantsov, A.I. Gavrilov, E.S. Baryshnikov // Information technologies for modeling and management. 2008. No 5 (48). P. 586—593.

- ***Energy-ecology*** inspections of the complex technological objects on the basis of the energy-buses (in Russian) / A.G. Vakulko, G.A. Romanov, A.V. Valerko // Energosberezhenie. 2008. No 4.
- ***Mobile*** lab application for execution of an energy audit and the ecology measurements (in Russian) / A.G. Vakulko, G.A. Romanov, A.V. Valerko // Proc. of III conf. "Energy saving in municipal economy. 2008.
- ***Unfuel*** energy installation including the detander-generator aggregate, an air compressor and an air turbine (in Russian) / V.S. Agababov, J. Mishner, E.V. Dzhuraeva et al. // Energosberezhenie i vodopodgotvka. 2007. No 6 (50). P. 61—63.
- ***Detander***-generator aggregates on the stations of technological pressure reduction for the transported gas (in Russian) / V.S. Agababov, A.V. Koriagin // MPEI Publishing House, 2007. 48 p.
- ***Installation*** for an electric energy production on the basis of the DGA, an air turbine and a compressor (in Russian) / V.S. Agababov, E.V. Dzhuraeva, A.Yu. Dzhuraev // MPEI Vstnik. 2007. No 2. P. 48—53.
- ***Koriagin, A.V.; Derkach, A.N.*** Determination of the optimal temperature of the direct network water (in Russian) // Energosberezhenie i vodopodgotvka. 2008. No 3 (53). P. 61—62.
- ***Effective*** application of the technological pressure drops for the transported gas (in Russian) // Energoaudit (information-analytical journal). 2008. No 1 (5). P. 16—19.
- ***Danilov, O.L.; Bobriakov, A.V.; Shapovalova, G.P.*** Thermal-vision method application for analysis of a heat-and-mass exchange process effectiveness on the surface of the surrounding constructions of the building (in Russian) / Under edition of Garyaev A.B.: MPEI Publishing House, 2007. 48 p.

Patents

- ***Patent 68073 (RF), МПК F02G 1/04, F04D 25/00, F25B 11/00, F01K 23/00, F02G 7/36.*** System for gas supply / V.F. Agababov, N.D. Rogalyov, A.Yu. Arkharova, A.N . Brusnitsyn // BI. 2007. No 31.
- ***Patent 72048 (RF) МПК F25B 11/02.*** Detander-generator aggregate / V.S. Agababov, I.V. Matveev // BI. 2008. No 9.
- ***Patent 72049 (RF) RU МПК F25B 11/02.*** Detander-generator installation / V.S. Agababov, A.A. Aleksandrov, E.V. Dzhuraeva, P.A. Kostiuchenko // BI. 2008. No 9.

Dissertations

- ***Stefantsov A.G.*** Development of the construction approaches to the adaptive sectoral information-analytical systems: Cand. Sci. (Techn.) Dissertation. 2007.
- ***Bobriakov A.V.*** Development and implementation of the scientific and managerial methods for effectiveness increase of the sectoral energy consumption in budget sphere: Cand. Sci. (Techn.) Dissertation. 2007.

Partners

- Federal Educational agency:
- Accounting and Financial Control Division
- Division of Federal Property and Material-Technical Base Development
- TEK Department of Minpromenergo of RF, Moscow
- Moscow Energy Director Board
- Material-Technical Supplying Division of Minobrazovanie of RF, Moscow
- Energy Managers Association of Russia

- «Gspromenergo» company, Moscow
- Tatenergo company, Kazan
- Republican Center on energy and resources saving of Tatarstan Republic
- JSC Lighthouse Energy Investments
- Association AVOK, Moscow
- Russian Association of energomanagers

Unique equipment

- Mobile measuring laboratory for the energy audit and ecology measurements fulfillment manufactured by the company «Gasunie Engineering & Technology», Groenengen (The Netherlands)
- Measuring-calculation complex and device sets for fulfillment of the measuring inspections of the communal services and industrial enterprises objects
- Combined equipment for execution of the energy and ecology inspections and an energy audit including the determination on consuming power, electric energy quality, flow-measuring devices, concentration meters for CO, CO_2, NO_x, O_2, benzopyren etc.
- Software-technical complex for an information-analytical system for educational institutions including software-methodic support

RESEARCH LABORATORY OF GLOBAL ENERGY PROBLEMS (RL GEP)

Ph.: (495) 362-7037, (495) 362-7127,
fax: (495) 362-7037,
E-mail: nilgpe@mpei.ru,
http://gepl.narod.ru

AT RL GEP:
7 researchers

Head of Lab
Dr. Sci. (Techn.),
Professor Vladimir V. KLIMENKO

Main lines of research

- **Study of the world energy development regularities: an energy consumption evolution, a fuel mix variation, a resource basis, an influence on atmosphere and climate**
- **Investigations of the Russian energy development perspectives: the greenhouse gases and pollutants emission estimation, the possibilities of Kyoto Protocol obligations fulfillment and the economical mechanisms usage potential, an expected climate change influence on the power industry**
- **Study of the environmental aspects of the various branches of economy, particularly, the energy conservation technologies evolution in production and consumption of the different energy resources**
- **Study of the anthropogenic influence on the atmosphere: the reconstruction of time series for major greenhouse gases and pollutants emissions in the various sectors of the world and Russian economy, a development of the scenarios of the possible man-made influence on the chemical and radiation balance of an atmosphere, the ways of reduction of this negative influence**
- **Climate variation modeling and forecasting at the global and regional scale, in particular, an estimation of the anthropogenic contribution into the climate variations**
- **Studies of the feedback in the system «man-climate»: an estimation of possible climate variation consequences for the various human activity areas (in the electricity production, in the heat-supply systems, the nuclear power plant objects, the construction industry, a transportation); a development of the new approaches for mitigation of the future climate change effects on the economy of Russia**
- **Studies of the past climate and its connection with the civilization evolution: a paleoenvironmental research (the past climate reconstruction based on the palynological, dendrochronological and other approaches), a historical climatology (the past climate reconstruction on the basis of the historical written evidencies)**

Agreements, contracts, projects supported by the state budget

- Analysis of the Climate Change in European Russia with the Emphasis of the North Atlantic Circulation Simulated with the MPEI Climate Model
- Development of Scientific Methodological and Information Base for Research in the Field of Environment and Power Industry Interaction in Russian Federation.
- Study of the Climate Change Influence on Energy Industry in Russia
- Study of the Possibilities of the Cold Season Climate Forecasting for the Needs of Power Industry

- Study of the Technological and Environmental Problems of the Russian Heat Supply System under Conditions of Climate Change
- Study of the Basic Problems of the Oil and Gas Industry Development in Russia under Conditions of Climate Change
- Study of the Basic Problems of the Russian Power Industry in the Framework of the International Atmosphere and the Climate Protection Legislation
- Modeling and Forecasting of the Applied Climatic Characteristics Used for Projection of the Heat and Electricity Demand in Moscow Region.
- Development of the Scientific Basis for the Russian Heat Supply System Development in the Framework of the Kyoto Protocol
- Development of the Scientific Basis for an Innovation Development of the the Russian Power Industry in the Second Stage of the Kyoto protocol
- Decision making support system for the Russian Power Planning under Conditions of the Global Climate Change
- Development of the Composite Reconstruction of the Temperature and Precipitation in the Russian Arctic

Key publications

- *Klimenko, V.V* Climate Change Impact on the Heat Demand in Russia (in Russian). Energy. 2007. No 2. P. 2—8.
- *Klimenko, V.V.; Terioshin, A.G.; Beznosova, D.S* Onslaught of Civilization. Can the Planet Bear on Energy Impact on Nature and Climate in the Twenty-First Century? (in Russian) Oil of Russia. 2007. No 2. C. 38—43.
- *Klimenko, V.V.; Terioshin, A.G.; Beznosova, D.S.* Will Our Civilization Suffer a 'Thermal Schock'? (in Russian) Oil of Russia. 2007. No 7. P. 18—22.
- *Klimenko, V.V.; Khrustaliov, L.N.; Emel'yanova, L.V.; Ershov, E.S.; Parmuzin, S.Yu., Terioshin, A,G.* Climate Change and Dynamics of the Permafrost in Northwestern Russia within the Next 300 Years (in Russian). Earth Cryosphere. 2007. Vol. XI. No. 3. P. 3—13.
- *Klimenko, V.V.* A Composite Reconstruction of the Russian Arctic Climate in the 15th-20th Centuries (in Russian). Herald of the Moscow State University. Geography. 2007. No. 6. P. 16—24.
- *Korotayev, A.V.; Klimenko, V.V.; and Proussakov. D.B.* Origins of Islam: Political-Anthropological and Environmental Context (in Russian). Moscow: OGI Publ. 2007. 112 pp.
- *Klimenko, V.V.* Reconstruction of Climate in the Russian Arctic over the Last 600 Years Based on Documentary Evidence (in Russian) // Doklady RAN. Earth Sciences. 2008. Vol. 418, No. 1. P. 95—98.
- *Khrustaliov, L.N.; Klimenko, V.V.; Emel'yanova, L.V.; Ershov, E.D.; Parmuzin, S.Y.; Mikushina, O.V.; Terioshin, A.G.* Dynamics of the Permafrost Temperature in the Southern Regions of Cryolithozone under the Different Scenarios of Climate Change. Earth Cryosphere. 2008. Vol. XII. No. 1. P. 3—11.
- *Klimenko, V.V.; Gazina, E.A.* Eastern Europe Climate Change during the Last 250 Years Deduced from Instrumental Data (in Russian). Herald of the Moscow State University. Ser. 5. Geography. 2008. No 3. P. 60—66.
- *Klimenko, V.V.; Terioshin, A.G.* World Energy and Planetary Climate in the Twenty First Century (in Russian) // History and Modernity. 2008. No. 2. P. 87—94.
- *Klimenko, V.V.; Terioshin, A.G.; Mikushina, O.V.* Climatic Parameters Change and It's Role in the National Heat Supply Systems (in Russian) // News of Heat Supply. 2008. No. 8. P. 5—13.

- *Klimenko, V.V.; Terioshin, A.G.; Mikushina, O.V.* World Energy System and Global Climate in XXI Century in the Context of theHistorical Tendencies (in Russian). Russian Chemical Journal. 2008. Vol. LII, No. 6. P. 11—17.

Patents

- Certificate on registration of computer program № 2008613258. Software complex for processing of the meteorological information «STATIONS». 2008.
- Data base on the concentration of the greenhouse gases in an atmospere «GEPL-GHG» (request for registration of data base № 2008620289 dated 16/09/2008)
- Controlling system for a data base on the concentration of the greenhouse gases in an atmosphere «GEPL — GHG» (request for system registration № 2008614370 dated 25/09/2008)

Partners

- P.P. Shirshov Institute of Oceanology, RAS, Moscow
- A.M.Obukhov Institute of Atmospheric Physics, RAS, Moscow
- Institute of Geography, RAS, Moscow
- Geology Faculty of Lomonosov Moscow State University,
- Geography Faculty of Lomonosov Moscow State University,
- Historical Faculty of Lomonosov Moscow State University
- Energy Strategy Institute, Moscow
- Academy of Economical Security, Moscow
- Westphalian University, Munster, Germany
- Rhein University, Bonn, Germany
- Alexander von Humboldt Foundation, Bonn, Germany

R&D DEPARTMENT «MANAGEMENT PROBLEMS IN ENERGY-RESOURCE SAVINGS» (R&D MPERS)

Ph/fax: (495) 362-7796, (495) 362-7271

At MPERS:
4 researchers,
4 engineers.

Head of MPERS
Senior Researcher,
Ph. D. (Techn.) Boris F. REUTOV

Main lines of research

Research Supervisor

- **Development of a scientific-methodic basis of the energy savings control including the development of the formation principles of the federal, regional and municipal energy saving programs, of creation and the implementation principles for the normative-lawful, organizational-financial and technological policy in an energy saving area**

  Senior researcher Reutov B.F.
- **Scientific-methodic investigations and an informational-analytical system for the native developments, technologies and materials demonstration in the area of the energy saving control with the usage of the modern informational technologies**

  Antropov A.P.
- **Development of a scientific-methodical basis for implementation of the energy-effective projects with usage of the Kioto protocol mechanisms with the aid of the global climate changing consequences softening**

  Ph.D. Pyzhov I.N.
- **Fulfillment of the R&D projects on studying the application principles of the ecologically pure substances and materials in the modern energy-effective equipment**

  Engineer Shashkin A.P.

Agreements, contracts, projects supported by the state budget

- Execution of the patent, technical-economical and marketing researches, the analysis of the existing scientific and technological potential in the field of methane extraction from bio-gas; the possibilities of joint fulfillment of the problem-oriented searching investigations and creation the scientific start in the area of the methane extraction from bio-gas mixtures with the help of the gas-liquid membrane systems within the limits of international scientific co-operation
- Thermodynamic scheme investigations, a technical-economical analysis of technology effectiveness and promising market of the developed high-temperature hydrogen steam-generating aggregates of the multi-purposed application
- Scientific-methodical investigations for preparing the development forecasting ensuring the economic and technology competitiveness for promotion at a world market of the hydrogen technologies
- Information and consulting support of the Russian research institutions and research teams in the field of participation in the 7th frame EU program projects; the methodic escort of a joint research activity with participation of the Russian research institutions and research teams consisting of the international consortiums of 7RP projects on the specific direction "Energetic" as well as the preparation and escort of the project suggestions
- Development of the scientific and technology basis for creation of the binary geo-thermal energetic installation on the utilization of an geo-thermal heat-carrier

- Development of thermophysical fundamentals for production of the binary electrical generating installations

Key publications

- *Ustiuzhanin, E.E., Abdulagatov, I.M., Popov P.V., Shishakov, V.V.* Combined models for description of the thermodynamic properties on a boundary line in a wide temperature range including the critical area (in Russian) // Proc. of XXI Intern. Conf. on chemical thermodynamics. July 11—12, 2007. Suzdal, 2007. P. 65—70.
- *Shishakov, V.V,; Morozov, A.V., Ustiuzhanin E.E., Reutov B.F.* Thermodynamic properties of the water, methanol and ethanol on a boundary curve including the critical point vicinity (in Russian) // Proc. of IV Intern. Conf. "Super-critical fluids application in promising chemical technologies», Sept. 5—7, 2007. KazSCTU. Kazan, 2007. P. 17.
- *Rykov V.A., Kudryavtseva I.V., Ustiuzhanin E.E., Antropov, A.P.* State R23 equation for a wide range of the pressure and temperature including the critical area (in Russian) // Proc. of XVII Intern. Conf. «Influence of intensive energy flows on the substance», Feb. 27 — March 8, 2007. Terskol: OIVT RA, 2007. P. 63.
- *Rykov V.A., Ustiuzhanin E.E., Popov P.V., Reutov B.F., Rykov, S.V. Ammonia.* Density, enthalpy, entropy, isobar and isochoric heat capacity, sound speed in temperature range 196—606 K and for pressures 0,001—100 MPa (in Russian). GSSSD 227 — 08. FGUP Stsndartinform 49-05 dated 23/05/08. 2008. 28 p.
- *Model* analysis for the thermodynamic property description on a boundary line in a wide vicinity of the critical point (in Russian) / E.E. Ustiuzhanin, A.P. Antropov, V.A. Rykov et al. // Ibidem. P. 43—47.
- *Abdulagatov, I.M., Frenkel M., Reutov B.F., Ustiuzhanin E.E.* Application of NiST/TRC computer code for processing of the thermophisical data from Russian journals (in Russian) // Ibidem. P. 50—54.
- *Combined* equations for description of the liquid thermodynamic properties on a boundary line in a wide temperature range (in Russian) / E.E. Ustiuzhanin, B.F. Reutov, V.A. Rykov et al. // Ibidem. P. 28—35.
- *Equation* of the ammonia state for the wide pressure and temperature range including the critical area (in Russian) / V.A. Rykov, Ustiuzhanin, B.F. Reutov et al. // Proc. of XII Intern. Conf. on thermophysical properties of a substance. Oct. 2—5, 2008, Moscow, Russia. P. 33—39.
- *Abdulagatov, I.M., Frenkel M., Ustiuzhanin E.E., Reutov B.F.* Application of NIST/TRC procedures — data base for an analysis of the thermophysical information (in Russian) / / Ibidem. P. 36.
- *Scaling* models for the thermodynamic property description on a boundary curve. Ultrasound and thermodynamic substance properties (in Russian) / E.E. Ustiuzhanin, I.M.Abdulagatov, P.V. Popov et al. // Coll. of papers: Issue 34—35. Kursk State University. 2008. P. 120—128.
- *Shashkin, A.P.; Sergeev, V.V.* Packing waste product as a source of methane (in Russian) // Tara i upakobka. 2008. No 3. P. 41—43.

INSTITUTE OF ELECTRICAL ENGINEERING (IEE)

Institute Director

Ph.D. (Techn.), Associated-Professor
Sergey A. GRUZKOV
Ph.: (495) 362-7105
Ph/fax: (495) 673-3231
E-mail: IETDIR@mpei.ru

Institute Departments

ELECTROMECHANICS (EM) DEPARTMENT

Ph.: (495) 362-7269, (495) 362-7189,
fax: (495) 362-7269,
E-mail: em@mpei.ru,
Internet site: http://elmech.mpei.ac.ru

At EM Department:
26 teachers,
5 researchers,
19 Ph. D. students.

Head of Department
Dr. Sci. (Techn.),
Professor Vladimir Ya. GECHA

Main lines of research

Research Supervisor

- **Development of the highly-effective AC electric machines**
  Professor Ivanov-Smolenskii A.V.
- **Development of the mathematical models and methods of analysis of the electromechanical power converters**
  Professor Kopylov I.P.
- **Development of the methods of analysis and design of the electric machines for dynamic operating conditions**
  Professor Bespalov V.Ya.
- **Design and development of the controlled electric machines with a wide range of regulation**
  Professor Kuznetsov V.A.
- **Development of the methods of analysis of the horsepower electric machines**
  Associated-Professor Semenchukov G.A.
- **Analysis and design of the non-conventional electric power sources**
  Associated-Professor Kotelenets N.F.
- **Reliability analysis of the electric machines and a research of the electric machines with increased reliability**
  Associated-Professor Kuznetsov N.L.
- **Development of high-speed high-power voltage stabilizers based on thyristor-transformer schemes**
  Associated-Professor Korobkov S.A.
- **Development of the high-speed methods of analysis of the transient processes in the electric machines with the solid-state converters**
  Associated-Professor Shirinskii S.V.

Agreements, contracts, projects supported by the state budget

- Development of the calculation methods and a design approach of the special electromechanical converters.
- Design of the switched-reluctance drives for the auxiliary mechanisms.
- Design of the highly reliable resource-saving generators, the starter-generators and the electric motors.
- Numerical simulation of a free-piston linear generator.
- Analysis of the electromagnetic processes in an asynchronous generator with a solid rotor for the diesel locomotive power supply.
- Consultation services for setting in operation, maintenance and repair of the gasket units for the hydro- and turbogenerators.

- Consultation services for maintenance and repair of the electromechanical drives for the copier and printer devices.
- Development of a testing bench for a medium power voltage stabilizer.

Key publications

- *Semenchukov, G.A.; Zakharenko, A.B.* Analysis of a synchronous electric machine with the skew permanent magnets (in Russian) — Elektrotekhnika. 2007. No 2. pp 59—65
- *Kopylov, I.P.* Electromechanics and the theory of Big Bang. (in Russian) — Elektrotekhnoka. 2007. No 4. pp 59—62
- *Ivanov-Smolenskii, A.V., Kuznetsov V.A., Petrichenko D.A.* Evolution of a combined method of the electric machine analysis (in Russian). — Elektrotekhnika. 2007. No 8. pp 4—12
- *Osin, I.L.; Moschinskii, Yu.A.* Electric motors with the permanent magnets in the excitation systems (in Russian). — Elektrotekhnika. 2007. No 8. pp 13—18
- *Kopylov, I.P., Ambartsumova, T.T.* Evolution of the methods and programs of macro-simulation of the electric machines (in Russian). — Elektrotekhnika. 2007. No 8. pp 19—24
- *Merenkov, D.V., Semenchukov, G.A.* Optimization of the single-phase induction motors with a non-symmetric 3-phase stator winding (in Russian). — Elektrotekhnika. 2007. No 8. pp 25—31
- *Sokolova, E.M.* Comparative analysis of dynamics of the AC and DC electric drives for a cable industry (in Russian). — Elektrotekhnika. 2007. No 8. pp 32—37
- *Altov, V.A., Kopylov, S.I.* Increasing reliability of the power systems by the superconducting devices (in Russian). — Elektrotekhnika. 2007. No 8. pp 37—42
- *Experience* and perspectives of making the high-voltage generators of 110-500 kV (in Russian) / Ivanov-Smolenskii A.V., Pintal Yu.S., Kuznetsov V.A. — Elektrichestvo. 2007. No 10. pp 11—18
- *Ivanov-Smolenskii, A.V., Goncharov, V.I., Glazkov, V.P.* Electromagnetic analysis of an inductor generator with an unipolar field winding at stator (in Russian). — Elektrichestvo. 2007. No 10. pp 18—23
- *Kuznetsov, V.A., Kuzmichev, V.A.* Engineering design method for an inductor machine for the switched-reluctance drive (in Russian). — Elektrichestvo. 2007. No 10. pp 24—32
- *Semenchukov, G.A., Sentiurikhin, N.I., Merenkov, D.A., Mashkin, V.G.* Theory and the methods of computer-aided design of series and parametric series of the low power induction motors (in Russian). — Elektrichestvo. 2007. No 10. pp 33—37
- *Osin, I.L., Sentiurikhin, N.I., Tatarinov, M.G.* Evolution of a scientific school on the horsepower electric machines analysis at the Department of Electromechanics (in Russian). — Elektrichestvo. 2007. No 10. pp 37 v 41
- *Kuznetsov, N.L., Kotelenets, N.F.* Reliability of the electric machines and design of experiments (in Russian). — Elektrichestvo. 2007. No 10. pp 42—44
- *Aung Win Tut, Moschinskii, Yu.A.* Mathematical model of a frequency controlled induction motor in the a,b,c / α,β coordinates, while taking into account a saturation and the iron losses (in Russian). — Elektrichestvo. 2007. No 11.
- *Tamoyan, G.S., Afonin, M.V., Sokolova, E.M., Myo Tet Thu.* Perspectives of the synchronous generators with the permanent magnets and reciprocation of an inductor (in Russian). — Elektrichestvo. 2007. No 11.
- *Kopylov, I.P.* Where Electromechanics go (in Russian). — Elektrotehnika. 2007. No 12.

- *Improvement* of the electric machine characteristics by using of the oiling brushes based on a molybdenum disulfide (in Russian). / Bespalov V.Ya., Izotov A.I., etc. — Elektrotekhnika. 2007. No 6. pp 32—42
- *Bespalov, V.Ya., Makarov, L.N.* Main directions of improvement of a structure and a technology of the low-voltage induction motors (in Russian). — Privodnaya tekhnika. 2007. No 5. pp 14—19
- *Mathematical* simulation of the MHD-processes in the liquid metal flow at electromagnetic mixing in the PNRS devices (in Russian). / Grachev V.G., Sivak B.A., Zarubin S.V., etc. — Metallurg. 2008. No 4. pp 45—50
- *Bespalov, V.Ya., Maksimkin, V.L., Antonenkov, A.V.* Application of the artificial neural networks for analysis of an induction motor, working at random load (in Russian). — "Elektromekhanika" University Transactions. 2008. No 1. pp 57—59
- *Application* of the oiling brushes for increasing lifetime of an electric machine commutator (in Russian). / Bespalov V.Ya., Izotov A.I., Mamaev G.A., et al. — Mehanizacia I elektrifikacia selskogo hoziaistva. 2008. No 4. pp 19—21
- *Decrease* of the brushes deterioration at the electric machines of a waterproof version (in Russian). / Bespalov V.Ya., Izotov A.I., Mamaev G.A., et al. — Mehanizacia I elektrifikacia selskogo hoziaistva. 2008. No 4. pp 24—26
- *Kuznetsov, V.A., Kuzmichev, V.A.* Design features of an inductor machine for the switched-reluctance motor (in Russian). — "Elektromekhanika" University Transactions. 2008. No 1. pp 60—68
- *Fundamentals* of the modern Power Engineering: textbook in 2 vol. (in Russian) / Kuznetsov V.A., etc. Under edition of Ametistov E.V. 4-th edition. — MPEI Publishing House 2008. Vol.1 — 472 p. Vol 2 — 632 p.
- *Kuznetsov, V.A., Magin, V.V., Markov, A.S.* Peculiarity of analysis and simulation of the switched-reluctance electric drives (in Russian). — Elektrichestvo. 2008. No 11. pp 30—36
- *Bespalov, V.Ya., Kotelenets, N.F.* Electric machines — 2-nd edition (in Russian). — Moscow. Publishing Center "Academia". 2008. 320 p.
- *Akimova, N.A., Kotelenets, N.F., Sentiurikhin, N.I.* Mounting, technical maintenance and repair of electrical and electromechanical equipment- 5-th edition (in Russian). — Moscow. Publishing Center "Academia". 2008. 304 p.
- *Kopylov, I.P.* Electromechanics and history of electromagnetic Universe (in Russian). — "Elektromekhanika" University Transactions. 2008. No 1.
- *Kopylov, I.P.* Generalized electric machine and a generalized electromechanical transducer (in Russian). — Elektrotekhnika. 2008. No 2
- *Kopylov, I.P.* Geoelectromechanics and Space (in Russian). — RAS Transactions "Energetika". 2008. No 5
- *Kopylov, I.P.* Reasonable life is eternal. In spite of global cataclysms (in Russian) — Ekonomika I filosofia. May 2008 (705) No 20—21

Patents

- *Pat. 63115 RF.* System of power supply and protection of the high-voltage power lines. Kopylov, S.I., Kotelents, N.F. 2007.
- *Pat. 70057 RF.* System of direct-drive hydraulic unit. Kopylov, I.P. Priority of 07.09.07
- *Pat. 71832 RF.* System of a single-phase synchronized motor. Kopylov, I.P. Priority of 03.12.07
- *Pat. 2328801 RF.* Slotless stator of a magneto-electric inverse machine and a method of placing on it of the single-layer 3-phase winding. Zherdev, I.A., Okuneva, N.A., Rusakov, A.M., Solomin, A.N., Fisenko, V.G. 2008.

- *Pat. 2331792 RF.* Magneto-electric inverse wing-turbine generator. Zherdev, I.A., Okuneva, N.A., Rusakov, A.M., Solomin, A.N., Fisenko, V.G. 2008.

Dissertations

- *Panikhin M.V.* Research of transients and radio noise in the AC commutator motor. — Cand. of Sci. (Techn.) Dissertation. 2007.

Partners

- Pskovelectromash company, Pskov, Russia
- Elektrosila company, St.-Petersburg, Russia
- All-Russian Research and Design Institute of Electrical Engineering Industry (VNIPTYIEM), Vladimir, Russia.
- Yaroslavl Electromechanical Plant, Yaroslavl, Russia
- Crosna company, Moscow, Russia
- Electromagnetic systems and technologies company, Moscow, Russia
- Ford Motor Company, Dearborn, Michigan, USA
- Olton Drives, Lids, UK
- Holek, Ridderkerk, Netherlands
- Technical University of Eindhoven, Netherlands
- Norwegian University of Science and Technology — NTNU, Trondheim, Norway
- Sofia Technical University, Sofia, Bulgaria
- University of Calgary, Calgary, Canada
- Wisconsin-Madison University, Madison, Wisconsin, USA
- Colorado University, Denver, Colorado, USA
- University Del Vale, Cali, Columbia
- University of Punta Arenas, Chili
- Tsinghua University, Beijing, China
- North China Technical University, Beijing, China
- Dong Fong Works, China
- University of Lille, France

Unique equipment

- Stand for the testing characteristics of a linear induction motor.
- Stand for the testing characteristics of a thyristor-transformer voltage stabilizer
- Computer-based stand for automatic testing of the electric motors
- Stand for simulation of an elevator drive

PHYSICS OF ELECTROMATERIALS AND AUTOMATION OF ELECTRICAL-TECHNOLOGICAL COMPLEXES (EMAETC) DEPARTMENT

Ph.: (495) 362-7858, (495) 362-7180,
Internet site: http://ftemk.mpei.ac.ru,
e-mail:CheparinVP@mpei.ru;
TikhonovAI@mpei.ru

At EMAETC Department:
37 teachers,
2 researchers,
20 Ph.D. students.

Head of Department
Dr. Sci. (Techn.),
Professor Sergey V. SEREBRIANNIKOV

Main lines of research

Research Supervisor

- **Synthesis and research of the heterogeneous magnetic compositions for an electromagnetic compatibility.**
  Professors Serebriannikov S.V., Cheparin V.P.
- **Synthesis and research of the heterogeneous composition electrotechnical materials with extremal properties.**
  Professor Filikov V.A.
- **Synthesis and research of the biocompatible materials for medicine.**
  Profesor Arseniev P.A.
- **Synthesis of the new high-temperature oxide materials**
  Professor Balbashov A.M.
- **Inductive low-temperature heating**
  Professor Kuvaldin A.B.
- **Computer control systems for the electrotechnological installations**
  Professor Rubtsov V.P.
- **New electrotechnological processes for the pure materials and composites synthesis.**
  Professor Rubtsov V.P.
- **Installations for the ion-plasma technologies.**
  Professor Dolbilin E.V.
- **Controllable power supplies for the electrotechnological installations**
  Senior research Peshekhonov V.I.
- **Communication cables construction and technology optimization**
  Associated-Professor Riazanov I.B.
- **Educational web-applications.**
  Associated-Professor Tikhonov A.I.

Agreements, contracts, projects supported by the state budget

- Materials for a radio wave absorption
- Synthesis, and research of the new electro-radio materials and technologies
- Crystal growth instrumentation with the floating-zone melting and radiation heating
- Electrotechnical ceramics for the microwave applications
- Web applications on the elecrotechnical materials for distance learning
- Controllable power supplies for the plasmatrons
- Electrotechnological processes effects on environment.

- Processes in the inductive technological installations
- Vacuum conductive coatings
- Nano-particles in the heterogeneous materials in the electrotechnics and energetic.

Key publications

- *Scherbakov, A.V.; Rubtsov, V.P.* Electron gun model for the precision welding (in Russian) // MPEI Vestnik. 2007. No 4, P. 60.
- *Kuvaldin, A.B.; Pogrebisski, M.Ya.* Calculation of the thermal and electrical characteristics of the inductive crucible mixers (in Russian) // Electrometallurgy, 2007, No 12, p. 18—26.
- *Nekhamin, I.S.; Rubtsov, V.P.* Investigation of the control system for direct current arc steel-making furnace (in Russian) // MPEI Vestnik. 2007. No 5, P. 34—40.
- *Borodin, S.O.; Rubtsov, V.P.; Emelyanov, A.L.; Ivashin, A.D.* Control system for the electron-beam cover deposition process (in Russian) // MPEI Vestnik. 2007. No 5, P. 45—51.
- *Dolbilin, Ye.V.; Kokorin, A.V.* Analysis of the impulse arc installations for a chemical thermal treatment (in Russian) // Electrica No 5, 2007, p. 25—29.
- *Borodulin, V.N., Serebriannikov, S.S.* Composite materials and their adhesive properties (in Russian) // MPEI Vestnik. 2007. No 5, P. 9—13.
- *Cheparin, V.P.; Smirnov, D.O.* Li-spinel composite material magnetic spectrum (in Russian) // MPEI Vestnik. 2007. No 5, P. 26—33.
- *Cheparin, V.P.; Eremtsova, L.L.; Cherkasov, A.P.* Hexagonal ferrite synthesis and properties (in Russian) // MPEI Vestnik. 2007. No 5, P. 18—25.
- *Borodulin, V.N.; Sutchenkov, A.A.; Tikhonov, A.I.* Educational web-complex on the electrotechnical materials. (in Russian) // MPEI Vestnik. 2007. No 5, P. 26—33.
- *Arseniev, P.A.; Balin, V.N.* Nano-materials for medicine (in Russian) // MPEI Vestnik. 2007. No 5, P. 68—74.
- *Kustov, Ye.F.; Nefedov, V.I.* Tetrahedral symmetry of the nano-particles composition and structure (in Russian) // Russian Academy of Sciences Reports, 2007, v. 412, No 5, p. 651—655
- *Kustov, Ye.F.; Nefedov, V.I.* Hexagonal symmetry of the nano-particles composition and structure (in Russian) // Russian Academy of Sciences Reports, 2007, v. 412, No 4, p. 507—512.
- *Tikhonov, A.I.* Dynamic HTML (in Russian). Moscow, Binom Publisher, 2008, 496 p.

Dissertations

- *Kokorin A.V.* Installations for chemical and thermal treatment in the arc impulse discharge. Dr, of Sci. (Techn.) Dissertation, 2007.
- *Lepeshkin A.R.* Effective conditions for the rapid inductive heating with a glance of thermal, Cand. Science (Techn.) Dissertation, 2007.
- *Ptitsina Ye.V.* Theory and practice of the effective regimes of the effective electrolysis and gas-discharge installations with the complex forms currents, Cand. Science (Techn.) Dissertation, 2007.

Patents

- *Certificate* on the useful model No 75129. «Control unit for the inductive heating» / Kuvaldin, A.B., Pogrebisski, M.Ya Fedin, M.A // BI, 2007, No 17.

- *Certificate* on the useful model No 75068 «Unit for the temperature control of an electric resistance furnace»/ Rubtsov, V.P., Fadeeva, N.K., Pugachev, A.A. // BI, 2008 No 10.
- *RF Patent № 2329588* «Control unit for a stepper motor» / Rubtsov, V.P., Rubtsov, M.V., Lukianov, R.V. // BI, 2008, No 20.

Partners

- Bulgarian Electronics Institute, Sofia Bulgaria.
- Chenstohovsky Polytechnic University, Poland
- Technical University in Ilmenau, Germany
- Tuyang Technological University, China
- Army Medical College, RF Defense Ministry, St. Petersburg
- Russian Research Institute of Electrothermal Inventory, Moscow

Unique equipment

- Installations for a synthesis of the high-temperature oxides with the optical floating-zone melting
- Inventory for the thermographic and microcalorimetric analysis
- Inductive heating installation with the inductor cryogenic cooling
- Electron-beam installation for the high-melting materials melting
- Vacuum high-temperature electric furnace
- Web applications for distance learning on the elecrotrotechnical materials (the electronic tutorials, a virtual laboratory)

ELECTROTECHNICAL COMPLEXES OF SELF-CONTAINED OBJECTS (ECSCO) DEPARTMENT

Ph. : (495) 362-7100,
E-mail: ecao@ecio.mpei.ac.ru,
ETKAO@mpei.ru
Internet site: http://ecio.mpei.ac.ru

At ECSCO Department:
13 teachers,
7 researchers,
10 Ph.D. students.

Head of Department
Dr. Sci. (Techn.),
Professor,
Winner of RF President Award Sergey I. MASLOV

Main lines of research

Research Supervisor

- **Power supply systems for the self-contained objects and sources of a secondary supply**

  Professor V.G. Eremenko
- **Automation of the research and development associated with the electromechanical and electrotechnical systems with the use the up-to day information and communication technologies**

  Professor S.I. Maslov
- **Structure, algorithmic and parametric synthesis of the resource- and energy-saving power electronic devices with an advanced electromagnetic compatibility and the electronic energy systems on this base**

  Professor G.S. Mytsyk
- **High-speed electrical and turbo-jet machines on the basis of the synchronous machines with a permanent magnet excitation on the leaf gas-dynamic bearings.**

  Senior Researcher M.U. Rumyanzev
- **Electromechanical systems on the basis of the inductor electromechanical converters and the synchronous machines with a permanent magnet excitation.**

  Leading Researcher A.M. Rusakov
- **General-purpose electric drives on the basis of the hysteresis motors.**

  Professor V.N. Tarasov

Agreements, contracts, projects supported by the state budget

- Development of the devices for a self-contained power supply of a spacecraft
- Light engineering pulse current sources and the low voltage high-current sources
- Power supply system of the distributed power pulsed loads.
- Non-contact systems for the compact accumulator charging
- Research and development of the data-communication system for the automation of educational experiments on the basis of the electrical engineering, electronics, electromechanic and the electromechanical systems with a possibility of a remote access.
- Development and introduction of the complex system for an individual practical training of the experts in the field of natural science, technique and technology on the basis of the distributed network of the educational complexes for general professional training in the system of the public technical education with a possibility of a remote access.

- Development of the electronic devices and systems, including the military applications.
- Research and development of the high-speed electrical compressor on the basis of a switch drive with a permanent magnet excitation on the leaf gas-dynamic bearings.
- Development of the methods and means for research and design of the ac electronic electromechanical systems on the basis of the inductor electromechanical converters and synchronous machines with a permanent magnet excitation.
- Development of the electric drives for the oil production equipment, the micro cryogenic systems, the compressors of the refrigeration units, an urban transport, and the excavating machines.
- Development of the generators for the self-contained power plants, such as the wind-driven generators, the hydroelectric generators, and the supply line-feeding generators.
- Development of the electromechanical systems on the basis of the hysteresis motors for the textile, chemical and atomic industry and the absorbent technology.
- Research and modeling of the progressive electromechanical systems for the different purpose centrifuges.
- Development of a scientific base for creation of the new generation power supply systems

Key publications

- *Gruzkov, S.A. et al.* Electrical equipment of the aircrafts. Textbook for the institutes of higher education in two parts. Part 2. Systems and the elements of the electrical equipment (in Russian). MPEI Publishing House, 2008. 550 p.
- *Lipay, B.R., Solomin, A.N., Tyryschev, P.A.* Electromechanical systems (in Russian). MPEI Publishing House, 2008. 320 p.
- *Yeremenko, V.G., Zhirnova, N.B., Tokarev, A.B., Gruzkov, S.A., Velikoretskiy, A.A., Vorontsov, K.A.* Physical and technical bases of an energy effectiveness and a safety growth for the space electrical power supply of the distributed remote pulse loads (in Russian). MPEI Vestnik, 2007. No3. p. 40—44.
- *Yeremenko, V.G., Varlamov, D.O., Vorontsov, K.A.* Hardware-based method of increase the energy efficiency of the high voltage storage batteries (in Russian). «Electronic components», 2007, No 7, p. 38—44.
- *To keep* the information of engineering education: electronic educational resources of MPEI. Part 2 (in Russian). / Assemblers: Arbuzov Yu.A. and others. Editor: Maslov S.I. MPEI Publishing House, 2007. — 314 p.
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- *Berilov, A.V., Gruzkov, D.S., Obradovich, V.A.* About the approach to the simulation loading devices synthesis (in Russian). MPEI Vestnik, 2007. No 3. p. 27—32.
- *Maslov, S.I., Arbuzov, Yu.A., Berilov, A.V., Gruzkov, D.S., Lipay, B.R., Obradovich, V.A., Stankevich, I.V., Stukalin, V.N.* Polytechnic Internet-laboratory of MPEI (in Russian). MPEI Vestnik, 2007. No 3. p. 55—62.
- *Konyahin, S.F., Mytsyk, G.S.* Electromagnetic and electric-power compatibility of the primary and secondary power-supply systems for the flying objectives (in Russian). "Power Supply", 2007. No 1. p. 68—73.
- *Mytsyk, G.S., Konyahin, S.F., Tsishevskiy, V.A.* Rectified voltage rippling doubling in a bridge rectification circuit (in Russian): MPEI Vestnik, 2007. No 4. p. 76—84.
- *Berilov, A.V., Mytsyk, G.S., Hlaing Min U. M.* About the features of design and the ways of quality performance perfection for the inverters with an internal high-frequency converter (in Russian): MPEI Vestnik, 2007. No 4. p. 85—92.

- *Rumyantsev, M.Yu., Zakharova, N.E., Sigachiov, S.I.* Development experience for the high-speed turbo-electrical drives at MPEI department "Electrotechnical complexes of self-contained objects (in Russian). MPEI Vestnik, 2007. No 3. p. 45—50.
- *Rumyantzev, M.Yu.* High-voltage integrated circuit for an industrial drive (in Russian)/ «Electronic news», 2007, No 7, p. 18—22.
- *Rumyantzev, M.Yu., Stukalin, D.V.* Adjustable electric drive on the basis of the brushless electric motors without a rotor encoder for the household appliances (in Russian). «Electronic components», 2007, No 7, p. 17—19.
- *Rusakov, A.M., Okouneeva, N.A., Solomin, A.N., Shatova, I.V.* Mathematical model of an electromagnetic process in the brushless motors (in Russian). MPEI Vestnik, 2007. No 3. p. 33—39.
- *Rusakov, A.M., Shatova, I.V.* Simulation of the thermal processes in a switched reluctance motor with an electromagnetic excitation (in Russian). "Electricity".-2007. — No 4, p. 42—49.
- *Rusakov, A.M., Okouneeva, N.A., Solomin, A.N.* Brushless electric motors used in composition of the petroleum producing equipment (in Russian). "Electricity".-2008. No 1, p. 60—66.
- *Rusakov, A.M., Safronenkov, Yu.A., Zherdev, I.A., Solomin, A.N.* Excitation winding inductor machines application outlooks (in Russian). "Electrical engineering".-2008. No 4, p. 38—44.
- *Tarasov, V.N.* Development and the technical possibilities of new types of the synchronous electric motors for take up units of the molding machines (in Russian). — "Chemical Fibres". 2007. No 1, p. 50—55.
- *Tarasov, V.N.* Development prospects and a competitive capacity of the hysteresis synchronous drive among the drives with the brushless electric motors (in Russian). — "Electricity". 2007. No 5, p. 54—60.
- *Tarasov, V.N.* Current status and the development problems of a synchronous-hysteresis drive (in Russian). MPEI Vestnik, 2007. No 3. p. 15—20.
- *Kiryukhin, V.P., Santalov, A.M., Khotsyanova, O.N., Khotsyanov, I.D.* Electric drive with the brushless motors for a rotary pump (in Russian). MPEI Vestnik, 2007. No 3. p. 21—26.
- *Tarasov, V.N.* Development and technical possibilities of new types of the synchronous electric motors for take up units of the molding machines (in Russian). — "Chemical Fibres". 2007. No 1, p. 50—55.
- *Tarasov, V.N.* Development prospects and a competitive capacity of the hysteresis synchronous drive among the drives with the brushless electric motors (in Russian). — "Electricity". 2007. No 5, p. 54—60.
- *Tarasov, V.N.* Current status and the development problems of a synchronous-hysteresis drive (in Russian). MPEI Vestnik, 2007. No 3. p. 15—20.
- *Kiryukhin, V.P., Santalov, A.M., Khotsyanova, O.N., Khotsyanov, I.D.* Electric drive with the brushless motors for a rotary pump (in Russian). MPEI Vestnik, 2007. No 3. p. 21—26.

Patents

- *Patent 64452 RF.* Interrelated synchronized electric drive for a textile machine / Tarasov V.N., Sizyakin A.V., 2007.
- *Patent 59906 RF.* Rectifier unit / Mytsyk G.S., Gavrilov I.V., Zabotin Yu.A., 2007.
- *Patent 76183 RF.* Dc-to-ac voltage converter. Variants / Berilov A.V., Konyahin S.F., Mytsyk G.S., Hlaing Min U., Tsishevskiy V.A., 2008.

- *Patent 2314627 RF.* Push-pull voltage converter / Brodnikov S.N., Kudryashev A.A, Miheev V.V., Mytsyk G.S. 2008.
- *Patent 2314630 RF.* Three-phase voltage measuring device./ Konyahin S.F., Miheev V.V., Mytsyk G.S., Tsishevskiy V.A., 2008.
- *Patent 2328801 RF.* Slotless stator of the electromagnetic inverted machine and the method of laying of a one-layer three-phase winding / Rusakov A.M., Zherdev I.A., Okuneeva N.A., Solomin A.N., Fisenko V.G., 2008.
- *Patent 2331792 RF.* Electromagnetic inverted wind-powered generator/ Rusakov A.M., Zherdev I.A., Okuneeva N.A., Solomin A.N., Fisenko V.G., 2008.

Dissertations

- *Shatova I.V.* Development of a checking calculation for a switched reluctance motor with a series field winding. Cand. of Sci (Techn.) Dissertation. 2008.
- *Okuneeva N.A.* Development and research of a drive for the oil-producing pumps with a submerged electromagnetic motor. Cand. of Sci. (Techn.) Dissertation. 2008.

Partners

- Izhevsk State Technical University, Izhevsk)
- Kyrgyzsky State Technical University, Bishkek
- Krasnoyarsk State Technical University, Krasnoyarsk
- Moscow Ordzhonikidze State Aviation Institute (MGAI), Moscow
- Moscow Bauman State Technical University (MGTU), Moscow
- "Aeroelektromash" Company, Moscow
- Ural Electrochemical Works, Novoural'sk, Russia
- All-Russian research institute of synthetic fibre, Tver
- Russian innovation fuel and energy Company (RITEK Company), Moscow
- Borets manufacturing company, Moscow
- Safonovo electric machine-building plant, Smolensk region, Safonovo
- Tushino machine-building plant, Moscow
- Sarapul generator plant, Ural, Sarapul
- Electromash Company, Moldova, Tiraspol
- Industrial Union " Energiya", Belarus, Grodno
- Mitchurin plant "Progress", Tambov region, Mitchurin
- Aviation Electronics and Communication Systems, a public corporation, Moscow
- TSENTROTEKH-EKhZ Scientific-and-Technical Center, St. Petersburg
- Development bureau " electrochemical plant, Nizhni Novgorod
- Federal State Unitary Enterprise «Prozhektor Leading Experimental Design Bureau», Moscow
- Yakor' Experimental Design Bureau, Moscow
- Federal State Unitary Enterprise «NPO Mashinostroyenia», Reutov-town

Unique equipment

- Equipment for the Polytechnic Internet-laboratory "Electrical engineering and electronics foundations"
- Automatic laboratory complex for the investigation of the electromechanical and electrotechnical systems with a remote access via the computer networks.

ELECTRICAL AND ELECTRONIC APPARATUS (EEA)

Phone: (495) 362-7004, phone/fax: (495) 362-7835,
E-mail: eea-all@mpei.ru; eea@mpei.ru,
Internet site: http://www.mpei.ac.ru/elapp

At EEA Department:
19 teachers,
24 scientific researchers,
13 Ph. D. students.

Head of Department
Ph. D., Associated-Professor
Maksim V. RYABCHITSKIY

Main lines of research

Research Supervisor

- **Investigation and development of the energy converters for a superconducting magnetic energy storage and the non-conventional energy sources**
  Professor Rozanov Yu.K.
- **Investigation and development of the power quality regulators for the electric supply systems**
  Professor Rozanov Yu.K., Associared-Professor Riabchitski M.V.
- **Investigation and development of the systems with the electromechanical and power electronic control apparatuses on the basis of the microprocessors and the microelectronic facilities**
  Ph. D. (Techn) Kvasniuk A.A.
- **Calculation methods development for the electromagnetic systems**
  Professor Shoffa V.N., Senior Researcher Kurbatov P.A.
- **Investigation and development of the electromagnetic DC and AC systems for the oil and condensate extraction intensification**
  Senior Researxher Kurbatov P.A.
- **Fundamental investigations of the physical phenomena and a development of a system with the liquid-metallic compositional materials**
  Professor Degtiar V.G.
- **Investigation of the artificial intellect systems for selection of the electric apparatuses and its reliability estimation**
  Professor Godzhello A.G., Senior Researxher Kalashnikova A.V.
- **Investigation and development of the power supply systems with continuous remote monitoring of the operation parameters of system and power quality**
  Associated Professor Khruslov L.L.
- **Investigation and development of the high voltage vacuum circuit breakers and contactors**
  Professor Belkin G.S.

Agreements, contracts, projects supported by the state budget

- Development of the principles and bases of the control and commutation theory for the electric energy flows commutation by the modern power electronic facilities
- Certification testing execution in the area of the electromechanical apparatuses, the semiconductor converters and the UPS
- Artificial intellect system objectly-oriented on the electric apparatuses choice and interacted with the relational database
- Theoretical regulation method basis development for an electrical energy quality and creation of the active and hybrid filters for the flexible AC transfer lines and the active power filters-regulators on the basis of the power electronics elements

- Development of the high voltage apparatuses with a controlled switching time
- Development of an energy converter for the super-conducting magnetic energy storage based on the full-controlled power electronic switches
- Investigation and optimization of an autonomous power supply system with the non-conventional energy sources and the semiconductor converting devices
- Investigation of the methods and supportive tools for a static and dynamic stability of the power supply systems by means of a super-conducting magnetic storage
- Development of the submersible porous electromagnetic devices for the complex acoustic and magnetic influence on a working zone of the oil layer
- Development of the analysis and design methods for the electromagnetic and vibration apparatuses for the oil and condensate extraction intensification
- Development of the magnet suspensions and bearings on the basis of the high temperature super-conducting materials
- Development of the magnetic systems with the permanent magnets for a magnetic resonance tomography
- Development of the magnetic systems for a flaw detection of the oil lines

Key publications

- *Rozanov, Yu.K., Ryabchitskiy, M.V., Kvasniuk, A.A.* Power electronics: textbook for universities (in Russian). Moscow: MPEI Publishing House, 2007. 632 p.
- *Baranov, N.N., Kilimovsikij, I.I.* Electrophysical, biomedical and ecological problems of the cellular communication in Russia (in Russian). Moscow.: Informelectro, 2007. 63 p.
- *Kurbatov, P.A.* Mathematical simulation of the electromechanical systems of the electrical apparatuses (in Russian). Moscow: MPEI Publishing House, 2007. 110 p.
- *Rozanov, Yu.K., Ryabchitskiy, M.V., Smirnov, M.I., and Grinberg, R.P.* Application of Fuzzy Logic Instrument for Improving the Dynamic Characteristics of Hybrid Filters of Higher Harmonics (in Russian) // Elektrichestvo. 2007. No 1. P 23—31.
- *Baranov, N.N., Kilimovsikij, I.I.* Ecological problems of the cellular communication in Russia (in Russian) // Alternative energetic and ecology. 2007. No 1 (46). P. 102—112.
- *Belkin, G.S., Lukatzkaya, I.A., Romochkin, Yu.G.* Influence of the shape of the contact surface on characteristics of the vacuum arc-quenching chambers (in Russian) // Proc. Of scientific and technical conference «Electronics and vacuum engineering. Devices and equipment. Technology. Materials». Saratov: Publishing house of University of Saratov. 2007. Issue 2. P. 120—125.
- *Burman, A.P., Rozanov, Yu.K.* Main stages of an evolution of the electrical apparatuses (in Russian) // Electrotehnika. 2007. № 4. P. 3—8.
- *Korobkov, Yu.S., Krasova, N.S. Khromatov, V.E.* Effect of a magnetic field on the oscillation frequency spectrum of the rectangular plates (in Russian) // Electrotekhnika. 2007. № 4. P. 30—34.
- *Sitnikov, V.F., Ryabchitskiy, M.V., Smirnov, M.I.* Selection of the power electronics switches for the converters in a power industry (in Russian) // Electrotekhnika. 2007. № 4. P. 35—41.
- *Rozanov, Yu.K., Egorov, E.G., Egorov, G.E.* Non-destructive testing of a switchgear by the control of a regenerative electric strength (in Russian) // Electrotekhnika. 2007. № 4. P. 47—53.
- *Sazonov, V.V.* The conditioners to network on the basis of the active filter (in Russian) / / Electrotekhnika. 2007. No 5. P 28—34.

- *Serebryakov, D.S.* The new algorithm and the load voltage uninterrupted out-of-phase redundant circuit automatic switching on the device development (in Russian) // Electrotekhnika. 2007. No 5. P 54—60.
- *Kurbatov, P.A., Kyznetzova, E.A., Kylaev, Yu.V.* Design of the systems with the permanent magnets of an open type for a magnetic resonance tomography (in Russian) // Elektrichestvo. 2007. No 9. P. 48—52.
- *Rozanov, Yu.K., Ryabchitskiy, M.V., Sazonov, V.V., Smirnov, M.I.* Power quality regulator on the power active filters // Technical electrodynamics: Special issue. Power electronics and power efficiency. Kiev, 2007. Vol. 1 P. 25—28.
- *Sazonov, V.V., Kvasniuk, A.A., Kriukov, K.V.* Power supply system with the photovoltaic converters // Technical electrodynamics: Special issue. Power electronics and power efficiency. Kiev, 2007. Vol. 3 P. 77—78
- *Ryabchitskiy M.V., Sazonov V.V., Kriukov K.V.* Modern lab complex on an electrical and electronic apparatus // Technical electrodynamics: Special issue. Power electronics and power efficiency. Kiev, 2007. Vol. 4 P. 117—120.
- *Kyrbatov, P.A., Kyznetzova, E.A., Kylaev, Yu.V.* Design and the adjustment methods for the systems with the permanent magnets of an open type for a magnetic resonance tomography // Proc. on XV Int. conf. on permanent magnets: Souzdal`. 2007 P. 210—211.
- *Miedzinski, B., Shoffa, V.N., Cicerjukin, V.N., Michaluk, A.* Influence of Polarization on Performance of a Switch with Dry Change — over Reed // 2nd Int. Conf. of Electrical Products and Electrical Contact, March 28—31, 2007, Xiamen, China.
- *Rozanov, Yu.K. Mamedov, T.T.* Brightness controllers with the advanced energy characteristics for the aerodrome lighting (in Russian) // Electrotekhnika. 2008. No 6. P 52—58.
- *Rozanov, Yu.K., Ryabchitskiy, M.V., Lepanov, M.G., Kiselev, M.G.* Control of a power flow in a converter for the super-conductive magnetic energy storage (in Russian) // Electrichestvo, 2008. № 8.
- *Rozanov, Yu.K., Lepanov, M.G., Kiselev, M.G.* Control of a Converter with Superconductive Energy Storage Inductor // Proc. on EPE-PEMC`2008, 1—3 September 2008, Poznan, Poland.
- *Rozanov, Yu.K., Kriukov, K.V.* Control of the power flow in an energy system on based grid connected photovoltaic generator // Proc. on Int. Conf. WSEAS'08, July 2008, Heraklion, Greece.

Dissertations

- *Sazonov V.V.* Unified power quality regulator based on the series and the shunt power active filters: Cand. of Sc. (Techn.) Dissertation, Moscow., 2007.
- *Serebryakov D.S.* Multifunctional installation for the uninterrupted grid switching: Cand. of Sc. (Techn.) Dissertation, Moscow., 2007.
- *Smirnov M.I.* Start-regulating device based on static VAR compensator: Cand. of Sc. (Techn.) Dissertation, Moscow., 2007.
- *Kyznetzova E.A.* Design and adjustment methods for systems with permanent magnets of open type for magnetic resonance tomography: Cand. of Sc. (Techn.) Dissertation, Moscow., 2007
- *Mamedov T.T.* Investigation and development of AC regulator for aerodrome lighting: Cand. of Sc. (Techn.) Dissertation, Moscow., 2008.
- *Koshelev K.C.* Investigation and development of protective equipment for static VAR compensator with digital control system: Cand. of Sc. (Techn.) Dissertation, Moscow., 2008.

Patents

- *Patent №2306661 RUS.* Voltage regulator / Yu.K. Rozanov, M.V. Ryabchitskiy, V.V.Sazonov, M.I.Smirnov // Registered 20.09.2007.
- *Patent №2304337 RUS.* Standby power service device / Yu.K. Rozanov, M.V. Ryabchitskiy, D.S.Serebryakov // Registered 10.08.2007.

Partners

- JSC «Federal Grid Company of Unified Energy System» (OJSC FGC UES), Moscow
- Non-Commercial Partnership "Innovations in Power Engineering", Moscow
- JSC Research and Development Center of Power Engineering (OJSC R&D center of PE), Moscow
- Sister company of JSC R&D center of PE — VNIIE, Moscow
- Sister company of JSC R&D center of PE — Research center VVA, Moscow
- S&P All-Russian R&D Institute of Electromechanics (S&P VNIIEM), Moscow
- State Center «Andreev Acoustical Institute», Moscow
- State Unitary Enterprise «All-Russia Electrical Engineering Institute named after Lenin», Moscow
- Andreyev Acoustic Institute, Moscow
- Millitary-engineering academy of Strategic Rocket Forces named after Peter the Great, Moscow
- State Unitary Enterprise «Golovnoe osoboe konstruktorskoe Buro Projector», Moscow
- ABB Russia, Ltd, Moscow
- JSC Symmetron Group, Moscow
- JSC Schneider Electric, Moscow
- FIRELEK Ltd, Moscow
- Interelektrokomplekt, Ltd (IEK, Ltd), Moscow
- «Hightech — Power Systems», Ltd, Moscow
- JSC Electrozavod, Moscow
- JSC Power electronics of Siberia, Novosibirsk
- JSC Electrotechnical group «Ruselprom», Moscow
- JSC «Electric motor drive and Power electronics» (CJSC ELSIEL), Moscow
- Russian Electrotechnical company, Ltd (REK, Ltd), Moscow
- JSC UZO-electro, Moscow

Unique equipment

- Hole acoustical installations for the oil and gas condensate producing intensification
- Vacuum test bench for the electrical apparatuses up to 5 kA
- Equipment set for he electrical apparatuses testing under a high pressure condition
- Equipment set for the low-voltage apparatuses and the UPS

ECOLOGY ENGINEERING AND PROTECTION OF LABOR (EEPL) DEPARTMENT

Ph.: (495) 362-7246, (495) 673-5770,
Ph/fax: (495) 362-7094,
E-mail: IEOT@mpei.ru,
Internet site: http://ecology2003.narod.ru

At EEPL Department:
23 teachers,
3 researchers,
4 Ph.D. students.

Head of Department
Active member of International Academy
of Ecology and Vital Activity Safety,
Correspondent-Member of Russian Academy
of Electrical Engineering,
Honored Worker of Higher Education,
Dr. Sci. (Techn.), Professor
Viktor T. MEDVEDEV

Main lines of research

Research Supervisor

- **Creation of an unified ecology monitoring system**
  Professors Medvedev V.T., Suzdaleva A.L., Associated-Professor Skibenko V.V.
- **Electric safety**
  Professor Medvedev V.N., Associated-Professor Karaliunetz A.V.
- **Electromagnetic compatibility**
  Professor Kolechitskiy E.S.
- **Development and implementation of a diagnostic system for the broncho-pulmonary diseases**
  Professors Medvedev V.T., Malyshev V.C., Associated-Professor Karaliunetz A.V.
- **Scientific-methodic support of the certification testing and the certification system for labor protection in the institutions**
  Professor Medvedev V.T., Associated-Professor Karaliunetz A.V.
- **Development and implementation of the automated monitoring and control systems for the technological processes of an ecological direction**
  Associated-Professors Makarov A.K., Karaliunetz A.V. Ph.D. (Techn.) Bukharov D.G.
- **Sensors development of a new generation for the harmful substance determination in an environment**
  Associated-Professor Monakhov A.F.
- **Vibro-acoustics of the electrical-mechanical systems**
  Professors Medvedev V.T., Malyshev V.C.,

Agreements, contracts, projects supported by the state budget

- Investigation of the electric technological processes influence to an environment and a development of its negative effect reduction principles
- Execution of the scientific-technological examination and an investigation of the exploitation features of the hardware-software complexes
- Constructive support of the serial output of the apparatuses MILTA
- Search investigations and development of the electrical machine vibro-acoustic parameter reduction methods for the air-force objects

- Investigation of the electric technological process influence on an environment and a development of its negative effect reduction principles
- Development of a computer diagnostic complex for the bronchopulmonary system condition monitoring in a pediatric practice
- Investigation of the dangerous and harmful manufacturing factor levels at the working places in order to execute its attestation and development the recommendation to these levels reduction
- Audit and certification in the field of a labor safety
- Development of the human protection means against influence of the harmful and dangerous manufacture factors
- Development of the regulations, the methodic instructions, the standard and guide lines in the area of a labor safety

Key publications

- *Karaliunetz, A.V.; Medvedev, V.T.* Russian Encyclopedia on a labor safety (in Russian) — 2nd Edition. Moscow. NC ENAS Publisher, 2007.
- *Skibenko, V.V.; Medvedev, V.T.; Makarov, A.K.* Protection against the polluting substances in the biosphere (air) (in Russian). MPEI Publishing House, 2007. 96 p.
- *Medvedev, V.T.; Afonin, V.I., Yurgenson, T.S.* Reduction of the vibration and noise levels in the electric machines (in Russian) // Elektrichestvo. 2007. No 11. P. 57—60.
- *Malyshev, V.S.; Chebysheva, O.V.* Frequency spectrum modeling for a respiratory noise during an analysis of the personnel labor conditions (in Russian) // MPEI Vestnik. 2007. No 3. P. 139—142.
- *Malyshev, V.S.; Geppe, N.A.; Batyreva, O.V.* Undulation passing of a bronchial asthma at children. Therapy of acute condition(in Russian) // Trudny patsient. 2007. Vol. 5. No 2. P. 43—47.
- *Malyshev, V.S.; Geppe, N.A.; Batyreva, O.V.* Combined bronchial therapy of the bronchial asthma at the children acute condition (in Russian) // Pediatria. Appendix 1. 2007. P. 38—45.
- *Medvedev, V.T.* Analytical repot «Labor safety in the Russian energetic: ensuring of the safe labor conditions and a labor safety, a personnel health conservation and strengthening — the investments into a human capital (in Russian)». Moscow: RaEl Association, 2007. 129 p.
- *Dolin, P.A.; Medvedev, V.T.; Korykov V.V.; Monakhov, A.F.* Electric safety. Theory and practice: MPEI Publishing House, 2008. 270 p.

Dissertations

- *Kondratieva O.E.* Development of an estimation method of the labor safety condition on the electrical power engineering enterprises: Cand. Sci. (Techn.) Dissertation. 2008.

Partners

- «NPO of space instrumentation» company, Moscow
- R&D Institute of pediatrics and pediatric surgery, Moscow
- RAO «EES Rossii», Moskva

Unique equipment

- Computer-diagnostic complex PATTERN
- Automate system of the ecology monitoring and the meteorological parameters
- Complex for the certification tests of the information technology equipment and the working places attestations on a labor protection correspondence establishment
- Automated system for a water quality control
- Complex for the automated monitoring of the vibro-acoustic characteristics of the electrical machines and mechanisms
- Anechoic chamber with an equipment complex for the vibration and noise investigation

ENGINEERING MANAGEMENT (EM) DEPARTMENT

Ph.: (495) 362-7474, (495) 362-7516, (495) 362-7801,
ph/fax: (495) 362-7757,
E-mail: IM@mpei.ru.; LisinPV@mpei.ru

At EM Department:
21 teachers,
22 Ph.D. students.

Head of Department
Dr. Sci. (Techn.),
Professor Viktor K. PAULI

Main lines of research

Research Supervisor

- **Quality system management**

  Professor Lozenko V.K.
- **Management of the state and municipal purchases: an organization and an execution of the competitive tenders**

  Professor Vedeneev G.M.

Key publications

- *Vedeneev, G.M., Efimov, A.R., Ivanov, A.P.* To everybody who is related to state and municipal orders: State and Municipal Order. Queries and answers (in Russian). Moscow. MPEI Publishing House, 2008. 84 p.
- *Zvezdin, A.L., Mel'nik, M.V.; Panteleev, A.S.* Audit and checking (in Russian). Moscow. KNORUS Publisher, 2007. 204 p.
- *Pauli, V.K.* Problems of a project implementation of the reliability consumer electric supply growth and technical-economical effectiveness increase of the electric supply systems — the distributive electric networks owing to normalization the reactive power and the voltage flows (in Russian) // Power supply and problems of West Ural energetic. 2007. No 4. P. 14—18.
- *Pauli, V.K.* Importance of a normative base in the flow normalization of the reactive power and voltage levels (in Russian) // Novels in Russian electrical power engineering. 2007. No 4. P. 53.
- *Pauli, V.K.* Reactive power compensation as am effective mean of the rational electrical energy application (in Russian) // Energoexpert. 2007. No 2. P. 16—22
- *Lozenko V.K.* // Novosti teplocnabzhenia. 2007. No 9. P. 8—13.
- *Lozenko V.K., Kolesova, E.V.* Persistent improvement is the basing principle of a quality management system (in Russian) // Standarty i kachestvo. 2007. No 3. P. 56—63.
- *Lozenko V.K., Morozov, D.V.* Specific character of the TV-personnel management (in Russian) // Upravleniy personalom. 2007. No 16. P. 74—80.
- *Lozenko V.K., Morozov, D.V.* TV-personnel in the organization: facts, arguments, summaries, (in Russian) // Upravleniy personalom. 2007. No 15. P. 34—40.
- *Lozenko V.K.* Evolution laws of business cenosis (in Russian) // Obshaya i prikladnaya tsenologia. 2007. No 5. P. 39—44.
- *Lozenko V.K., Morozov, D.V.* Meetings in XXI century (in Russian) // Upravleniy personalom. 2007. No 19. P. 22—26.

Partners

- «Crossna motor» company, Moscow
- «Agregat-privod» company, Moscow
- «Safonov Electromechanical plant» company, Safonovo, Smolensk region

- «Raketno-kosmicheskiy kompleks Energia» company, Korolev, Moscow region
- Lavochkin RIA, Moscow
- Lepse RIA, Kirov
- National foundation for expert training, Moscow
- Avto-tractor electric equipment plant, Moscow
- RIA Avtoelectronics, Moscow
- Institute of industrial development, Moscow
- Academy of national economy at RF Government, Moscow
- Academy of Public Service, Moscow
- State University of Management, Moscow
- Novosibirsk Electric Engineering University, Novosibirsk
- International Independent ecology-politology university, Moscow
- Russian Association of business education, Moscow
- Higher school of economics — Institute of state purchases, Moscow
- Moscow Government Department on Competitive policy (Tender Committee) Monetary Financial Division of Moscow Government
- Technical University Hangzhou, China
- Nilsbrok College, Copenhagen, Denmark
- Technical University of Gabrovo, Bulgaria
- Slovac Technical University in Bratislava, Slovacia
- Middlesex university business school
- University of Greenwich London metropolitan university London school of Economics
- ProInvest Comsulting Group, Moscow
- Institute of industrial development, Moscow
- Academy of public economy at Russia Government
- Academy of State Service, Moscow

AUTOMATED ELECTRICAL DRIVE (AED) DEPARTMENT

Ph.: (495) 362-7425,
fax: (495) 673-1348,
E-mail: AEP-all@mpei.ru; AEP@mpei.ru

At AED Department:
20 teachers,
20 researchers,
25 Ph.D. students.

Head of Department
Ph. D. (Techn.),
Professor Yuri N. SERGIEVSKIY

Main lines of research

Research Supervisor

- **Control system development with the technological parameters regulation by the electrical drive facilities**
  Professors Kozyrev S.K., Osipov O.I.
- **Methods and technical facility development for the resources and energy savings by the electrical drive means**
  Professor Il'inskiy N.F., Associated-Professor Ladygin A.N.
- **Creation of the methods and the technical facilities for the gated-inductor electrical drive control**
  Professors Il'inskiy N.F., Bychkov M.G., Associated-Professor Kozachenko V.F.
- **Development of the theoretical basics and control systems for the high-precision tracking electrical drives**
  Professor Terekhov V.M.
- **Development of the precision double-channel electrical drives with the piezo- and magneto-striction motors**
  Leading Researcher Nikolskiy A.A.
- **Development of the effective systems of the asynchronous electrical drive on the basis of the thyristor voltage regulators**
  Professor Masandilov L.B.
- **Development of a precision motion reproduction system on the basis of the multi-coordinate step motors**
  Senior Researcher Balkovoy A.P.
- **Development of a multi-purpose microprocessor controller on a new element base for the electrical drive**
  Associated-Professor Kozachenko V.F.
- **Methodic and technical support for the electrical drives testing**
  Associated-Professor Sergievskiy Yu.N.
- **Development of the frequency-controlled electrical drives on the modern element base**
  Leading Researcher Kudryavtsev A.V., Associated-Professor Ostrirov V.N.

Agreements, contracts, projects supported by the state budget

- Comparative analysis and determination of the development perspectives in the area of the electrical drives and its components
- Development of the new methods and algorithms for an energy saving in the systems of the building air heating
- Modes Investigation and an operation algorithms development for the control station of the pumping aggregate group
- Development of the promising technical solutions for a mass regulated electrical drive of the gated-inductor type

- Modernization of the pumping installation electrical drive on the basis of the complete energy- and resources saving device with a frequency converter
- Development of the calculation methods of the object-oriented gated-inductor electrical drives
- Development of a controller for the gated-inductor electrical drive
- Testing and certification of the low-voltage complete devices, the electronic converters and the electrical motors
- Development and implementation of the magneto-striction electrical drives for a turning machine for precision turning of the car pistons
- Development of a precision electric drive on the basis of a gated electric electrical drive with the permanent magnets
- Development of the frequency-controlled asynchronous electrical drive with vector control

Key publications

- *Electric* drive and the control systems (in Russian) // Coll. of MPEI papers. Issue 683. Moscow. MPEI Publishing House, 2007. 60 p.
- *Il'inskiy N.F.* Fundamentals of an electric drive (in Russian). Moscow. MPEI Publishing House, 2007. 224 p.
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- *Nikolskiy A.A.* Stability of the self-learning electric drives for a cutting machine feed and the accuracy of the learning processes (in Russian) // Elektrichestvo. 2007. № 5.
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- *Experience* and prospects of the electric drive modernization in the large city life support systems (in Russian) / N.F. Il'inskiy et al. // Elektrichestvo. 2007. No 7. P. 28—34.
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- *Kuz'min, I.K.; Osipov, O.I.* Power indices of the synchronous gated electric drive of the axis fans for a mountain mine ventilation (in Russian) // Elektrichestvo. 2007. No 3. P. 59—61.
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Dissertations

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- *Postnikov, V.G.* Optimization of the position electric drive of the automated systems on the basis of a fuzzy-controller: Cand. Sci. (Techn.) Dissertation. 2007.
- *Kuz'min I.K.* Energy saving synchronous electric drive of the mine ventilation installation: Cand. Sci. (Techn.) Dissertation. 2007.
- *Kozachenko V.F.* Creation of a set of the highly productive built-in micro-controller control systems for the modern complete electric drive: Dr. Sci. (Techn.) Dissertation. 2007.
- *Fukalov R.V.* Development of the multi-purposes modular sensorless control systems for the gated-inductor electrical drive: Cand. Sci. (Techn.) Dissertation. 2005.

Partners

- «Elektroprivod» company, Moscow
- «All-Russia R&D Institute of electromechanics» company, Moscow
- Yaroslavl' elektromashinostroitel'ny zavod, Yaroslavl'
- Moscow representative office of Siemens company, Germany
- Moscow representative office of Sneider Electric, France
- Ilmenau Technical University, Germany
- «Rudoavtomatika» company, Zheleznogorsk, Kursk region

Unique equipment

- Multi-purposes setup for the converters, the motors and the complete electrical drives testing at the normalized net and load parameters
- Thermal-moister camera with the testing equipment for a strength and chatter stability
- Computerized setup for the automated electric motor testing

ELECTRIC TRANSPORT (ET) DEPARTMENT

Ph.: (495) 673-3371, (495) 361-1620,
ph./fax: (495) 362-7420, (495) 362-7049,
E-mail: GlushenkovVA@mpei.ru

At ET Department:
14 teachers,
4 researchers,
8 Ph.D. students,
1 traineer.

Acting Head of Department
Ph. D. (Techn),
Senior Researcher
Vladimir A. GLUSHENKOV

Main lines of research

Research Supervisor

- **Development of the electric drives for the autonomous rolling-stock**
  Senior researcher Trofimenko V.I., Associated-Professor Kolobov M.G.
- **Development of the electric equipment for the trams and the trolley-buses**
  Senior Researcher Glushenkov V.A.
- **Development of the electric supply and traction substation systems for an urban electric transport**
  Professor Sleptsov M.A., Associated-professor Dolaberidze G.P.
- **Development of the rail and special rolling-stock**
  Senior Researcher Trofimenko V.I.
- **Automated control systems for the main transport**
  Professor Tulupov V.D.

Agreements, contracts, projects supported by the state budget

- Investigation of a reversible traction converter for the rolling stock of the urban electric transport
- Investigation of a traction converter for a trolley bus with an mixed excitation motor
- Development of the traction electric equipment for the trolley bus with the IGBT regulators
- Development of the traction electric equipment for the urban electric transport rolling stock
- Development of a converter for the trolley bus traction electric drive
- Development of the complete traction electric equipment for the tram-car with the reduced floor level
- Development and manufacture implementation of the effective electric drives on the basis of the inductor motors for the auxiliary needs of the urban electric transport rolling stock
- Development of the ecologically friendly and the effective electric drives on the basis of the commutatorless AC motors with usage of the promising semiconductor devices
- Development of the special electric equipment, assembling, testing and energy indexes estimations for the pre-production section model of the ER2S electric train
- Adjustment and development testing of the traction electric equipment experimental complexes with the asynchronous traction electric motor for the electric buses and trolley buses
- Protection of the DC cables for the ground-based urban electrical transport
- Development of asynchronous traction electric drives for a kar

- Development and implementation of the converter power series for the traction asynchronous drive of the different purposes
- Development of a traction drive with a linear asynchronous motor for the transport mini-system
- Choice of a creation conception for the traction electric drive with the electric energy recuperation system and the energy unit on the basis of an electrochemical generator with the hydrogen-air fuel elements for the pre-production model of the small capacity urban bus
- Development and implementation of the traction converters for the trolley buses and the electric buses
- Theoretical principle development for the transport systems creation with the combined energy units and the life cycle intellectual support
- Development of conceptual conditions and the methodic bases of the energy effectiveness and ecological safety increase for the electric complexes and systems
- Development of a structure conception of the electric drives with an energy recuperation and accumulation system for an urban public transport

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- *Borodina, V.V.* Smooth start device for an electric drive with the synchronous machines of 6/10 kV voltage class (in Russian) // MPEI Vestnik. 2008. No 4. P. 77—79.
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- *Dmitrenko, M.M.; Sleptsov M.A.* Investigation of the micro-processor control algorithms for a traction drive (in Russian) // Ibidem. P. 182—183.
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- *Koval', A.Yu.; Tulupov, V.D.* Exploitation problems of a metro rolling-stock with the asynchronous traction machines (in Russian) // Ibidem. P. 187—188.
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- *Rumiantsev, M.V.; Glushenkov, V.A.* Electrical equipment of a duo-bus with an energy accumulator (in Russian) // Ibidem. P. 197—199.
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- *Rashek. Yu.V.; Tulupov, V.D.* Energy saving DC electrical train (in Russian) // Ibidem. P. 284.
- *Glushenkov, V.A., Rumiantsev, M.V.* Electrical equipment of a duo-bus with an energy accumulator (in Russian) // Ibidem. P. 285.

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- *Patent 2297709 (RF)* Regulation device for the DC traction electric drive / V.A. Glushenkov, G.A. Smerdov, V.N. Khmarskiy , Yu.I. Filin // BI. 2007. No 11.
- *Patent 2322751 (RF)* Regulation device for the DC traction electric drive / V.A. Glushenkov, V.N. Khmarskiy, Yu.I. Filin // BI. 2007. No 11.

Partners

- «Dinamo» company, Moscow
- «Sankt-Peterburg trolley-bus plant» company, Sankt-Peterburg
- «Trolley-bus plant» company, Engel's, Saratov region
- «Zaporozhie elektroapparatny zavod», Zaporozhie, Ukraine
- «Vologdaelektrotrans» company, Vologda
- «Trans-Alfa» company, Vologda
- «Ratep» company, Serpukhov, Moscow region
- «Tatelektromash», Naberezhnye Chelny
- State company «Mosgortrans», Moscow
- State company «Gorelektrotrans», Sankt-Peterburg
- State company «Moscow subway», Moscow
- «Crossna-Motor» company, Moscow
- MosgortransNIIproekt, Moscow
- Moscow rail way — brancy of RZhD
- Moscow locomotive-repair plant
- R&D Institute of «Elektrotiazhmash» plant, Khar'kov, Ukraine
- «All-Russia R&D Institute of electric locomotive machinery» company, Novocherkassk
- RIA «Novocherkassk electric locomotive plant» company, Novocherkassk
- «Zavod Radiopribor»), Sankt-Peterburg
- Design Bureau «Yuzhnoe», Dnepropetrovsk, Ukraine
- Scientific-Technical Center «Temp», Moscow
- VNIPTIAEP «Dinamo», Moscow
- R&D Institute of urban electric transport, Moscow
- «Technical Center Electrotransservice», Mocow
- «Tatra-Yug» company, Odessa, Ukraine
- «Energia» company, Moscow
- «Maikop trolley bus Division»
- Raketno-kosmicheskiy komplex «Energia», Koroliov, Moscow region
- Moscow Committee on science and technologies
- JSC RsdioPribor, Sankt-Peterburg
- R&D Association AGREGAT, Moscow
- JSC TransElectric, Moscow
- JSC Konopus, Zlatoust

Unique equipment

- Installation for the traction electric drives testing for the trolley-buses and the motor-wheel machines
- Installation for the electric drive physical modeling with the inertial masses for transport means
- Setup for the electrical drive testing with the gated traction motors
- Modeling setup for the diesel-generator installation for cars with the motor-wheels
- High-voltage setup for monitoring and testing of the power semiconductor devices
- Setup for the car electric drive testing

- Setup for the high-voltage static converters testing for the inherent needs of a tram and a trolley-bus
- Setup for the motor-compressor testing with an inductor motor of the trolley-bus or subway moveable train
- Setup for the electric drive testing for the trams and the trolley-buses
- Setup for the traction motor testing for the trams and the trolley-buses by a pumpback method
- Setup for the DC and AC electric drive testing for the motor-wheel machines
- Setup for the traction drive testing of a Moon-buggy and the power barrows
- Setup for the linear asynchronous drive testing
- Setup for the microprocessor control system testing and adjustment for the traction AC and DC drives

POWER SUPPLY OF INDUSTRIAL ENTERPRISES (PSIE) DEPARTMENT

Ph.: (495) 673-3280, (495) 362-7386, (495) 362-7074,
E-mail: ESPP-all@mpei.ru; ESPP@mpei.ru

At PSIE Department:
19 teachers,
2 researcher,
23 Ph.D. students.

Head of Department
Ph. D. (Techn.)
Associated-Professor,
Sergey A. TSYRUK

Main lines of research

Research Supervisor

- **Electromagnetic compatibility of the electrotechnical complexes with the nonlinear characteristics.**

  Associated-Professor Tsyruk S.A.
- **Automation of the calculation-experimental investigations of transients in the power supply systems of the industrial enterprises.**

  Professor Gamazin S.I.
- **Energy consumption parameters determination and forecasting for the existing and rebuilt enterprises with an optimization of the mounted and repaired electric equipment structure.**

  Professor Kudrin B.I.
- **Electromagnetic compatibility of the power converter devices with the electric supply system of the industrial enterprises**

  Associated-Professor Bure I.G.
- **Energetic research of the enterprises, the organizations and the offices.**

  Associated-Professor Kondratiev A.V.
- **Electrical supply of the industrial enterprise consumers from the autonomous supply sources.**

  Associated-Professor Hevsuriani I.M.

Agreements, contracts, projects supported by the state budget

- Calculative researches of the regimes of the electric equipment PC-110/35/6 kV «DNS-32» and the substations 35/6 kV taking into account the structure and the configuration of the electric supply system of petroleum production and a work of the clustered consumers.
- Development of the measurement execution methods (MEM) of an electrical energy and an electric power by means of the automated information-measurement system of the commercial electric energy account.
- Research and development of the theoretical bases of an electric energy saving and an electric consumption regulation at the enterprises with the continuous technological process.
- 4. Conception development and the theoretical optimization substantiation of the electric consumption regimes and the electric energy saving at the enterprises with the continuous technological process.
- Fulfillment of the scientific-technical researches for searching of the technical solution, directing to unloading of the supplying main substation KNS-11 with giving out of the electric energy saving recommendations.

- Energy inspection (energoaudit) of the technological and energy equipment of petroleum engineering at «Holmogor-neft», «Muravlensk-neft», Zapoliar-neft» for «Sibneft-Noyabrskneftegas».
- Development of the issues «Consumers' electric energy decrease» and «Decrease of the peak consumption» of the city special program of the electric energy consumption in the city of Moscow during 2009-2013 years.
- Fulfillment of the reactive power energoaudit, the optimization of the regimes of the electric nets «Apatit».
- Assessment of the perspective requirement on the Moscow calculative regions in an electric energy for the medium-term and long-term perspective taking into account the programs of living and other kinds of building.

Key publications

- *Kudrin, B.I., Gamazin, S.I., Tsyruk, S.A.* Electrica: Classica. Probability (in Russian). Pricelogic. Issue 34. «Pricelogic researches». Moscow: Tekhnika, 2007. 384 p.
- *Bystritskiy, G.F.* Heat equipment of the industrial enterprises (reference materials) (in Russian). Moscow: «Energoprogress», 2007. 88 p.
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- *Golovin, V.A.* Measuring technique in the power supply (Methods and devices) (in Russian). Moscow: MPEI Publishing House, 2007. 72 p.
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- *Energy* power equipment of the industrial enterprises (in Russian) /G.F. Bystristkiy at al. — 4-th issue Moscow: Publishing Centre «Academia», 2008. 312 p.
- *Tsyruk, S.A.* Microprocessor device of the reserve fast-acting automatic engaging (in Russian) // Russian engineer. 2007. No 1. 18—19 p.
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- *Lebedev, G.M., Meshkov, D.M.* Determination methods of the optimal dimensions of a leveling cone on the basis of the electromagnetic field modeling in the three-dimensional field (in Russian) // MPEI Vestnik. 2007. No 12. 87—93 p.
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- *Krasnov, S.V.* Modern problems of a reliability supply of the energy supply systems of the industrial enterprises (in Russian) // Ibidem. P. 145—150
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- *Kulaga, M.A., Krasnov, S.V.* Problems of a continuous work supply of the industrial consumers (in Russian) // Ibidem. P. 253—256.
- *Matiunina, U.V., Sheviakova, N.N., Vikhrov, M.E.* Electric consumption monitoring at the regional level (in Russian) // Ibidem. P. 256—259.
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- *Kudrin, B.I., Pakhomov, A.V.* Classification of the megapolis electric energy consumers with a view of a prognosis the regional energy consumption (in Russian) // Ibidem. P. 139—144.
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- *Kireeva, E.A.* Modern vacuum contactors, the automatic switches, the arc-suppressing cameras (in Russian) // Prom. Energetika. 2008. No 1. p. 53—56.

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- *Mozgalin A.V.* Informational-methodic supply of hour capacity prognosis of an energy consumption at the enterprise output to the electric energy wholesale market: Cand. Sci. (Techn.) Dissertation. Moscow, 2007.
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- *Haritonov D.A.* Development of a choice method and the rational using of the co-generation systems as the sources of an electric energy at the enterprises on technical-economical guidelines: Cand. Sci. (Techn.) Dissertation. Moscow, 2007.
- *Vasiliev E.I.* Determination of consumers' and system's fact contribution to the non-sinusoidal voltage on the basis of the active experiments: Cand. Sci. (Techn.) Dissertatiion. Moscow, 2008.
- *Kiriukhin A.U.* Development and optimization of the hybrid filter parameters with a compensating transformer: Cand. Sci. (Techn.) Dissertation. Moscow, 2008.
- *Novikov S.S.* Operative method of the electric consumption planning and operating of the large-capacity electro-smelting kilns at work at the electric energy wholesale market: Cand. Sci. (Techn.) Dissertation. Moscow, 2008.
- *Genin V.S.* Methods and technical means of the operating, the control and the test of the electrotechnical and technological equipment of the petroleum and gas extractive enterprises: Cand. Sci. (Techn.) Dissertation. Moscow, 2008.

Patents

- *Patent on useful model No 63991 (RF).* Automatic switch device of consumers' reserve power supply / S.A. Tsyruk, S.I. Gamazin, V.M. Pupin, V.N. Kozlov, A.O. Pavlov // BI. 2007.
- *Certificate* on the state registration of computer program No 2008614389. Software complex «Self-triggering» / S.I. Gamazin, S.A. Tsyruk // BI. 2008.

Partners

- «Electroproekt», Moscow
- Polytechnic University, Wroclaw, Poland
- West-Siberia metallurgical plant, Novokuznetsk
- «FosAgro» company, Moscow

- «Tobolsk-Neftekhim» company, Tobolsk
- «Karelskiy Okatysh» company, Kostamuksha
- «Sibneft-Noyabrsk-neftegas» company, Noyabrsk
- «Toliatti-Kauchuk» company, Toliatti
- «Voronezhsintezkauchuk» company, Voronezh
- «Kuibyshevskiy neftepererabatyvauischiy zavod» company. Novokuibyshev
- «Gaspromenergo» company, Moscow
- «NIUIF» company, Moscow
- «VNIPIenergoprom» company, Moscow

INSTITUTE OF ELECTRIC POWER ENGINEERING (IEPE)

Institute Director

Ph.D. (Techn.), Associated-Professor
Boris I. SILAEV
Ph.: (495)362-7352, (495)673-4175
Fax: (495)673-4175
E-mail: IEEDIR-all@mpei.ru; IEEDIR@mpei.ru

Institute Departments

ЭЭС ELECTRIC POWER PLANTS (EPP) DEPARTMENT

Ph..: (495) 362-7139, (495) 362-7872,
E-mail: ES-all@mpei.ru,
ES@mpei.ru,
http://es.mpei.ac.ru

At EPP Department:
14 teachers,
2 researchers,
6 Ph.D. students.

Head of Department
Ph. D. (Techn.),
Associated-Professor
Yuri P. GUSEV

Main lines of research

Research Supervisor

- **Development of the scientific basis of the electrical installations designing. Development of the methods and the PC software for the short-circuit calculations.**

  Professor Gusev Yu.P.

- **Operation modes and diagnostics of the main electrical equipment of the power stations and substations.**

  Professor Starshinov V.A.

Agreements, contracts, projects supported by the state budget

- Development of the education quality indexes in the higher technical educational institutions and the information system structure for their monitoring
- Software development for breadboards of the diagnostic devices for the mechanical condition of the power transformer windings in the frequency domain. Calculation execution, and development of the methodic recommendations.
- Development of the National standard «Short-circuit currents in electrical installations. The calculation methods for the AC electrical installations with voltage below 1 kV» prerelease
- Development of the National standard «Short-circuit currents in the electrical installations. Terms and definitions» prerelease
- Electrical equipment examination of utilization permissibility at the JSC «FSC UES» electrical installations and participation in an expert commission activity on the electrical equipment attestation formed by JSC «FSC UES»

Key publications

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- *Dolin, A.P., Kozinova, M.A.* Basic positions and requirements of the new normative technical documentation of the rigid bus-bars at indoor and outdoor switch-gears 110—500 kV // Electro. 2008. No2. P. 31—37
- *Vasin, V.P., Dolin, A.P.* The isolation resource of the oil-filled transformers // Electro. 2008. No3. P. 12—17
- *Abdurahmanov, A.M., Lint, M.G, Misrikhanov, M.S., Fedorov, V.E., Shuntov A.V.* About a constructional solutions for the switch-gears with a combined apparatus // Electrical power stations. 2008. No 5. P. 50—55
- *Ignatov, V.V., Misrikhanov, M.S., Mozgalev, K.V., Shuntov, A.V.* About the mutual influence of the electrical grids under the short-circuit current limitation in the electrical system of the Moscow area // Electrical power stations. 2008. No6. P. 55—60

- *Abdurahmanov, A.M., Misrikhanov, M.S., Mozgalev, K.V. et al.* About switching resource of the breakers in the cases of short-circuits in a power grids // Electrical power stations. 2008. No10. P. 59—62
- *Abdurahmanov, A.M., Lint, M.G., Misrikhanov. M.S., et al.* About lay-out solutions for the switching substations 110—220 kV with the combined switch-gears // Electrical power stations. 2008. No11. P. 38—43
- *Starshinov, V.A., Vasin V.P., Polyakov, A.M.* Organization of the education quality control in Russia and abroad // MPEI Vestnik. 2008. No1. P. 141—147.
- *Polyakov, A.M., Starshinov, V.A.* About education quality indices // MPEI Vestnik. 2008. No4. P. 117—120.
- *Monakov, V.K.* The application of the residual current devices (RCD) in an effort of the greater electrical and fire safety // Electrical power stations. 2007. #6. P. 66—68
- *Dolin, A.P., Kozinova, M.A.* General provisions and requirements of the new normative documents on the rigid busbars of the switch-gears 110—500 kV. // Electrical power stations. 2008. No 2. P. 31—37
- *Lopatin, V.V., Trofimov, A.V.* CAD system for the automated control system of the thermal processes at the thermal power plants. // Proc. of Intern. Conf. "Theory and practice of development and maintaining the automated control systems for thermal processes: CONTROL-2008, Moscow: MPEI Publishing House. 2008. P. 128—131.
- *Trofimov, A.V.* Development of the data models // Informatization of engineering education: electronic educational resources of MPEI. Moscow: MPEI Publishing House. 2008. No 3. P. 217—218
- *Abdurahmanov, A.M., Misrikhanov, M.S., Shuntov, A.V.* Analysis of the collecting bars operational reliability on the substations // Electrical power stations. 2007. No 1. P. 42—45
- *Abdurahmanov, A.M., Misrikhanov, M.S., Shuntov, A.V.* Analysis of the breaker failure models in the switching circuits of the electrical installations // Elektrichestvo. 2007. No4. P. 2—11
- *Abdurahmanov, A.M., Misrikhanov, M.S., Shuntov, A.V.* Influence of an exploitation duration on the breaker failures in the high-voltage electric grids // Electrical power stations. 2007. N o 7. P. 59—63.
- *Balakov, Yu.N.* Personnel preparation to the knowledge testing in an electrical installation exploitation // Energobezopasnost v dokumentakh i faktakh. 2007. No 1, P. 22—38.
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- *Balakov, Yu.N.* Personnel preparation to the knowledge testing in an electrical installation exploitation // Ibidem. P. 32—49.
- *Balakov, Yu.N.* Personnel preparation to the knowledge testing in an electrical installation exploitation // Ibidem. P. 42—56.
- *Zhukov, V.V.; Minein, V.F.* Chronicle. Preferable report themes for participants of the immediate session of SIGRE-2008 // Promyshlennaya energetika. 2007. N o 11. P. 45—49.
- *Ignatov, V.V.; Misrikhanov, M.S.; Mozgaliov, K.V.; Shuntov, A.V.* About the power outlet scheme reliability for the electrical power plant in a region with high load density // Electrical power stations. 2007. No 9. P. 46—62.

- *Kriuchkov, I.P., Antipov, K.M.; Piratorov, M.V.* Load capacity of the cables. Electrical equipment testing on the short-circuit conditions // Electrical power stations. 2007. No 2. P. 43—45.
- *Monakov, V.K.* Application of an protective disconnection device for increasing a fire and electrical safety // Elektrooborudovanie. 2007. No 6. P. 66—68.
- *Monakov, V.K.; Adigamov, A.E.* Robust filtering problem on the basis of a theoretical-playing approach // Control systems and information technologies. 2007. No 12 (27). P. 208—213.
- *Monakov, V.K.; Redkozubov, S.A.; Adigamov, A.E.* A problem of dimension reduction of the linear stochastic models on the basis of a consistent approximation // Control systems and information technologies. 2007. No 12 (27). P. 377—382.
- *Vasin, V.P.* Metodological and practical problems of power grid monitoring as well as their systems integration // Collection of papers "Methodic problems of reliability research for large energetic systems. Issue 57. Irkutsk. ICEM SO RAN Publisher. P. 79—86.
- *Vasin, V.P.; Loskutov, V.F.; Starshinov, V.A., Poliakov, A.M.* System of a technical condition check of the main electrical equipment of the electrical power plants // Ibidem. P. 334—341.
- *Atamanov, V.V.; Kusnetsov, A.V.; Starshinov, V.A.* Operation mode stability analysis and recommendations for the oscillation suppression in the excitation systems for TVV-1000 turbo-generator on the NPP // Proc. of III Russian school-seminar "Exploitation stability of nuclear power plant elements" (Exploitation Stability-2007). Pizunda (Republic of Abkhasia), 2007.
- *Atamanov, V.V.; Starshinov, V.A.; Kusnetsov, A.V.* Using the generator of the nuclear power plant as a regulating element of the energy grid. Operation mode stability of TVV-1000 turbo-generator // Ibidem.
- *Gusev, Yu.P.* Modern requirements on the equipment diagnostic of the operative DC systems // Proc. of Scient. Sem. "Electrical Equipment and Distribution Systems. Electrical grids of Russia (LEP-2007).". Moscow. Exhibition Center. 2007.
- *Gusev, Yu.P.; Konovalov, A.A.* Problems of the thermal durability ensuring for the lightning protective wire with built-in fiber-optical cable at reconstruction of the air electric lines // Proc. of VII Intern.Conf. "Modern energy systems and complexes and their control". 2007. Novocherkask, April 20, 2007. In 2 volumes. South StateTechnical University, 2007. Vol.1. P. 4—5.
- *Transients* in the electrical power engineering systems / I.P. Kriuchkov; V.A. Starshinov, Yu.P. Gusev; M.V. Piratorov; under edition of I.P. Kriuchkov. Moscow. MPEI Publishing House. 2008. 416 p.
- *Balakov, Yu.N.* Safety of the thermal mechanical equipment and the heat network in querries and answers / Moscow. Energoservice Publisher, 2007. 880 p.
- *Minein, V.F.* Exploitation inspection and technical diagnostics of a high-voltage equipment. MPEI Publishing House. 2007. 35 p.
- *Zhukov, V.V.* Business-plan of an innovation project: theory and practice. Moscow. MPEI Publishing House. 2006. 350 p.
- *Minein, V.F.* Vacuum breakers. Moscow. MPEI Publishing House. 2006. 15 p.
- *Minein, V.F.* Elegas breakers, Moscow. MPEI Publishing House. 2006. 16 p.
- *Calculation* of the short-circuits and an electrical equipment choice / I.P. Kriuchkov; B.N. Neklepaev; V.A. Starshinov et al. / 2nd edition. Moscow. Academia Publishing House. 2006, 416 p.
- *Zhukov, V.V.* Business-plan of an innovation project. Theory and practice. Moscow. MPEI Publishing House. 2007. 352 p.

- *Monakov, V.K.* Devices for a protective disconnection. Theory and practice. Energoservice Publisher, 2007. 368 p.
- *Starshinov, V.A.* Fundamentals of a modern energetic / Under edition of E.V. Ametistov. Moscow. MPEI Publishing House. 2007.
- *National* Standard of the Russian Federation No R 52735-2007. Short-circuits in the electrical installations. Calculation methods in the AC installations of a voltage over 1 kV / I.P. Kriuchkov; V.V. Zhukov; Kuznetsov, Yu.P.; M.V. Piratorov. Moscow StandardInform Publisher. 2007. 54 p.
- *National* Standard of Russian Federation No R 52736-2007. Short-circuits in the electrical installations. Calculation methods for the electrodynamic and the thermal action of a short-circuit current. / I.P. Kriuchkov; V.V. Zhukov; Kudriatsev, et al. Moscow. StandardInform Publisher. 2007. 59 p.
- *Standard* of Organization "Methodic instructions for calculation and testing of the rigid busbar for 110—500 kV (M.A. Kozinova. Order of FSK EES Company No 176 dated 25/06/2007.
- *Standard* of Organization "Guiding document on designing of rigid busbar for 110—500 kV (M.A. Kozinova. Order of FSK EES Company No 176 dated 25/06/2007.

Dissertations

- *Abdurakhmanov A.M.* Development of the reliability models of a switching equipment and the recommendations on their application in the electrical power engineering problems: Cand. Sci. (Techn.) Dissertation. 2008.

Partners

- JSC «Federal grid company of unified energy system», Moscow
- JSC «Moscow unified electric grid company», Moscow
- JSC «Firm ORGRES», Moscow

Unique equipment

- Educational, Research and Testing Center (ERTC) of EPP consists of the Low-voltage laboratory, the High-voltage laboratory, the Automatic control system laboratory.
- A low-voltage laboratory is equipped with the DC source–bank of capacitors with total capacity 40F, the chargers and power inverters, the DC switchboard, the auxiliaries switchboard by Gutor company (Switzerland). Also there are several automated workplaces with Fluke oscilloscope, an adjustable electrical load, the switching devices for circuit shorting laptops.
- A high-voltage laboratory is equipped with the cubicle switch-gear with the unique vacuum switches and the relay boards in each. The switch gear and protection differs from feeder to feeder. Also there are several automated workplaces with the Fluke oscilloscope, the Fluke thermo-vision camera, the Fluke megger, the switching devices for circuit shorting laptop with the licensed particularized software for transients in the electrical systems research EMTP-RV Package (Canada).
- An automatic control system (ACS) laboratory is equipped with the automated workplaces for the electrical installations and automatic control system research. Large set of the ACS means allow operator to program controllers, to carry out the research of ACS different configurations and operational modes, to combine the equipment from the low-voltage and the high-voltage laboratories into an unified electrical system.

ELECTRICAL POWER SYSTEMS (EPS) DEPARTMENT

Ph.: (495) 362-8824, (495) 362-7012, (495) 673-0340
E-mail: EES-all@mpei.ru; EES@mpei.ru

At EPS Department:
28 teachers,
27 researches,
34 Ph.D. students.

Head of Department
Ph. D. (Techn.),
Associated-Professor
Yuri V. SHAROV

Main lines of research

Research Supervisor

- **Development and implementation of the methods and means ensuring an operational efficiency, a reliability and a stability provision of the electrical power systems**

  Associated-Professor Sharov Yu.V.
- **Development of the methods and means of the stability improvement for the electrical power systems**

  Professor Stroev V.A.
- **Scientific bases for optimization of the electrical power systems structure,**
- **the parameters and the operating conditions**

  Associated-Professor Shul'zhenko S.V.
- **Development of the automatic control and regulation systems in the electrical power systems**

  Associated-Professor Filippova N.G.
- **Development of the methods and means for the reliability provision in electrical power systems**

  Professor Fokin Yu.A.
- **Flexible AC transmission systems (FACTS)**

  Syromiatnikov S.Yu., researcher Loktionov S.V.
- **Head of research lab**

  Associated-Professor Ryzov Yu.P, senior researcher Kuznetsov O.N.
- **Energy storage application for improving of the electrical power system efficiency and reliability**

  Senior researcher Nikitin D.V.
- **Investigation on a physical model (EDM) for a behavior of the microprocessor based emergency control devices.**

  Senior researcher Syromiatnikov S.Yu.
- **Electromagnetic compatibility problem solutions for the technical devices and an electrical energy quality provision**

  Leading researcher Kartashov I.I.
- **Development of a modern technique for the technical-economical substantiating of the design solutions in the electrical networks area**

  Professor Zuev E.N.
- **Optimization of the electrical energy losses level in the electrical networks**

  Ph.D. (Techn.) Shvedov G.V.
- **Automation of operation and repairing of the distribution networks**

  Ph.D. (Techn.) Ponomarenko I.S.
- **Development of the flexible electrical transmission systems on the basis of the controlled saturated shunt reactors**

  Professor Briantsev A.M.

- **Perfection of a technique of the mechanical calculations of the transmission lines .**

  Professor Zarudsky G.K.

- **Optimization the structure and parameters of the electric supplying systems.**

  Professors Konyikhova E.A., Leshchinskaya T.B.

- **Automatic controlled systems for interconnection based on the electromechanical asynchronized units.**

  Professor Zelenokhat N.I.

Agreements, contracts, projects supported by the state budget

- Development of theoretical bases of the operation condition analysis of the electrical power systems and solution of their optimum control problems
- Development of the optimum control theory by the dynamic systems with reference to an electrical power system
- Investigation on MPEI physical model the performance of the microprocessor based devices of a emergency control aimed to limitating an overload of the transformer, the checking the efficiency of principles and algorithms emergency control automatics.
- Investigation on MPEI physical model the static and dynamic stability of the electrical power system containing mini-cogeneration plant.
- Investigation of the static and dynamic stability of the electrical power system containing steam and gas unit.
- Carrying out the analytic review of application the principles and methods of the modern electric network construction including the controlled electric networks
- Development of the new electric power interconnection concept for delivering electricity from Russian Far East to the Peoples' Republic of China and for examination of sections of substaions forinvestments into construction of the new generating capacities in a structure of the East OES
- Investigation of the static and dynamic stability of the electrical power system containing energy center on pump station «Khasyreiskaya»
- Carrying out of researches and working out the recommendations on improvement of quality of the electric power and reliability of electric supply system of the Aktogaisky mountain-concentrating plant combine
- Development of the theoretical bases of the operation condition analysis for the electrical power systems and solution of their optimum control problems.
- Rendering of services on research of the actual losses of the electric power in the electric networks of a power supply system for the various operating modes and development of a calculation technique adapted for the networks of JSC "NTEK"
- Development of the methodical guides for compensation of the reactive power at the consumer
- Development of the software, the abstracts of lectures, the laboratory research works and the distributing materials for courses of the qualification improvement of the FSK ENES personnel.
- Carrying out the quality parameter measurements of an electric power in points of electric power delivery to thehousehold consumers
- Estimation of losses and qualities of a voltage in networks 6—10/0.4 κV and the voltage regulation law choice in the supplying centers for needs of East ES branch of JSC "MOESK "
- Development of the methodical instructions under the analysis of an electric energy quality in the electric networks of ENES.

- Development of the calculation algorithms of the equipment electric parameters on the basis of ratings and formation of the knowledge base by definition of the equivalent circuit parameters of the electric network capital equipment in the steady-state operation conditions and at short-circuit
- Operation mode calculation of a southern part of a distributive network 6 (10) //35/10 кV branch of JSC "DRSK" Primorskye electric networks» and definition of the reasons of the transmission line and the transformer overload and also an expediency, a capacity and a place of connection of the IRM (Static VAR compensation) aimed at decrease the arising overloads.
- Development of the technical requirements and scheme-technical solutions for the controlled devices of the inductance-capacitor network parameters and a substantiation of their installation in the basic power units of ENES.

Key publications

- *Single-phase* sources of an uninterrupted supply of DPK series: dynamic and spectral characteristics (in Russian) / R.S. Beym, V.P. Klimov, V.A. Korotkov, et al. // Power electronics. 2007. No 2. P. 52—55.
- *Beym, R.S.; Syromiatnikov, S.Yu.* Physical model of MPEI and its role in carrying out of scientific researches and preparation of experts for electrical power industry (in Russian) // Elektrichestvo. 2007. No 9. P. 9—13.
- *Beym, R.S.; Syromiatnikov, S.Yu.* Research of the complex electrical power systems, their elements and devices on MPEI physical model (in Russian) //Collection of papers «Modern methods and software for the analysis and planning of a power consumption, balances of power capacity and the electric power». Moscow: ELEKS-KM Publisher, 2007. P. 232—237.
- *Beym, R.S.; Syromiatnikov, S.Yu.* Investigation of the electrical power systems and the microprocessor based automatic devices on MPEI physical model(in Russian) // Energetik. 2008. No 10. P. 17—19.
- *High-voltage* controlled devices of a voltage stabilization in network 110- 500 кV on the basis of the magnetically controlled shunt reactors and the banks of capacitors (in Russian) / A.M. Bryantsev, M.A Bryantsev, S.V.Dyagilev, et al. // Proc.of III Intern.conf. «The power supply system: management, competition, education». Ekaterinburg: UGTU-UPI Publisher. 2008. V. 2. P. 14—18.
- *Zarudsky, G.K.;, Syromiatnikov, S.Yu.* Specification of expressions for calculation of the transmission line and wires temperature at ultra-high voltage. // MPEI Vestnik. 2008. No 2. P. 37—42.
- *Zelenohat, N.I.; Korotchenko, V.V.* Increasing of a control efficiency excitation of a turbo-generator at consumption of reactive power (in Russian) // Izv. of high schools. Problems of energetic. 2007. No. 5—6.
- *Zelenohat, N.I.; Nguen T.N.; Sevastyanov, A.O.* Discrete control of an asynchronized operating condition of an electrical power system (in Russian) // MPEI Vestnik. 2008. No 3.
- *Zelenohat, N.I.; Sharov Yu.V.* New technological solutions of a problem of combined operation of the East and the West power systems (in Russian) // Elektrichestvo. 2007. No 9.
- *Zelenohat, N.I.; Rybtsov, A.L.* Dynamic characteristics of a turbo-generator with a nonlinear type regulator of excitation (in Russian) // Development of junior experts in the field of electric power industry: Collection of reports of III conf. Moscow: Dialog Elektro Publisher, 2008. P. 27—30.
- *Nasyrov, P.P.; Skoroshchinskiy, A.A.; Tu'lsiky, B.H.* About expediency of the centralized voltage regulation in distributive networks (in Russian) // Ibidem. P. 76—79.

- *Zelenohat, N.I.; Rybtsov, A.A.* Dynamic stability of a turbo-generator with a nonlinear type regulator of excitation (in Russian) // Izvestia of high schools. Problems of energetic. 2008. No 5-6. P. 116—119.
- *Karymov, R.R.; Ebadian, M.* Comparison of a magnetically controlled reactor (MCR) and a thyristor controlled reactor (TCR) from harmonics point of view (in Russian) // Electrical Power and Energy Systems. 2007. No 29. P. 191—198.
- *Kartashev, I.I.; Tul'skiy, V.N.* Estimation of the voltage drops in the distributive networks 6—10/0.38 κV in problems of the control of the established voltage deviation. The problems of electrical engineering, electrical power industry and electrotechnology (in Russian): Proc. of II All-Russian. conf. with international participation. V.1. Tolyatti: TGU Publisher, 2007. P. 121—127.
- *Kartashev, I.I.; Tul'skiy, V.N.; Podolskiy, D.S* Modern problems of management of the electrical energy quality (in Russian) // Energoaudit. 2007. No 3. P. 49—52.
- *Kartashev, I.I.; Tul'skiy, V.N.* Modern management problems of the electrical energy quality (in Russian) // Energonadzor and enrgobezonasnost. 2007. No 4. P. 61—64.
- *Kartashev, I.I.; Tul'skiy V.N.* Modern means for the control and the analysis of the electrical energy quality (in Russian) // Energoekspert. 2008. No 4. P. 36—39.
- *Management* of the electrical energy quality (in Russian) / I.I. Kartashev, V.N. Tul'skiy, R.G. Shamonov , et al.; under edition of Yu.V. Sharov. — 2 edition. Moscow: MPEI Publishing House. 2008. 354 p.
- *Kartashev, I.I.; Ryzhov, Yu.P.* Methods and the control facilities of the operation conditions of the electrical power systems and quality of the electrical energy (in Russian) // Electrichestvo. 2007. No 9. P. 20—25.
- *Konyukhova, E.A.; Rodina, L.S; Bartaev, O.V.* Definition of a mathematical expectation of the voltage drops in the aggregate radial cable lines up to 1 κV (in Russian) // Electrichestvo. 2007.No 7. P. 16—22.
- *Konyukhova E.A.* Influence of the compensating devices on the parameters of operation conditions of electrical networks (in Russian) // Electric equipment: operation and repair. 2008.No7. P. 11—18.
- *Konyukhova, E.A.; Tokarev, S.A.* Optimal degree of reactive power compensation in the electrical networks up to 1 κV under the 10 kV radial scheme (in Russian) // Industrial power energy. 2007. No 4. P. 20—25.
- *Konyukhova, E.A.* Influence of a voltage deviation on the work of the electrical equipment receiver (in Russian) // Electrical equipment: operation and repair. 2008. No 5. P. 15—20.
- *Konyukhova, E.A.* Regulation of a power consumption in a system of electrical supply under voltage 10/0.4 κV taking in consideration the static characteristics of loading (in Russian) // Electrichestvo. 2007. No 9.
- *Konyukhova, E.A.* Electrical supply of the objects (in Russian). Moscow: Publishing center "Academy", 2008. 319 p.
- *Kuznetsov, O.H.; Nikitin, D.V.* About application of accumulators of the electric power in the electrical power industry (in Russian) // Electrichestvo. 2007.No 9. P. 9—13.
- *Leshchinskaya, T.B.; Magdeev, E.V.* Reliability estimation of electrical supply of the agricultural consumers in an expert system of reliability estimation (in Russian) // Vestnik of FGOU VPO MGAU. Agroinjenerya. 2007. No 1. P. 19—24.
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- *Leshchinskaya, T.B.; Naumov, I.V.* Electrical supply of an agriculture (in Russian). Moscow: Kolos Publisher. 2008. 65 p.
- *Nikitin, D.V.; Kuznetsov, O.N.* About application of accumulators of the electrical power energy in the electrical power industry (in Russian) // Electrichestvo. 2007. No 9. P. 9—13.
- *Application* of voltage regulators aimed on economy of the electrical power in the systems of illumination of the industrial enterprises and cities (in Russian) / I.S. Ponomarenko, A.E. Burkovsky, A.G. Sumin, et al. // Promyshlennaya energetica. 2008. No 2. P. 34—37.
- *Ponomarenko, I. S.; Burkovskij, A.E.; Sumin, A.G.* Universal charge flating unit IPT-MEI.80 (in Russian) // Elektricheskie stantsii. 2008. No 5. P. 56—59.
- *Ponomarenko, I.S.* Device «ERIS-PKI.01» for search the places of isolation damage in an operative direct current network (in Russian) // Elektricheskie stantsii . 2008. No 6. P. 60—63.
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- *Platonova, I.A.; Roshchin, A.V.; Zhigulin, S.V.* Wires usage of AERO-Z mark and a spiral armature to them at reconstruction of the existing transmission lines (in Russian) // Proc. of Intern. scientific-practical electrical power seminar «Issues of designing, construction and operation of transmission lines in view of prospect of reliability increase of their operation at the present stage». Moscow, March, 26-30th, 2007. P. 275—283.
- *Control* of galloping on the high voltage overhead electrical lines / I.A. Platonova, A.A. Vinogradov, I.I. Sergey et al. // Final report to the grant INTAS ID: 03-51-3736. Bruxelles, Moscow, 2007. P. 165.
- *Platonova, I.A.; Siarghey, I.; Vinogradov A.; Kolosov S.; Lilien, J.L.* Subspan vibrations calculations for triple bundle with TDD devices // Seventh Intern. Symp. on CABLE DYNAMICS. Vienna (Austria), December 10-13, 2007. P. 151—158.
- *Platonova, I.A.; Vinogradov, A.A.* Mathematical model of the torsional damper of galloping of the split phases transmission lines of the ultra high voltage level // Proc. of VI Intern. scientific-tech. conf. «The science — to education, manufacture, economy». Minsk, 2008. P. 36.
- *Ryzhov, Yu. P.* Distant transmission lines of a ultrahigh voltage (in Russian). Moscow: MPEI Publishing House, 2007. 488 p.
- *Stroev, V.A.; Shelukhina, T.I.; Shulzhenko, S.V.* Development of a training-methodical complex for studying operation conditions and stability of the complex power systems (in Russian) // Electrichestvo. 2007. No. 9.
- *Stroev, V.A.; Poludnichin, P.Yu.* Influence of an controlled shunting reactor on a static stability of the complex electrical power systems (in Russian) // Proc. of XIII Conf. of graduate and PhD students "Radioelectronics, electrical and power engineering". In 3 volumes. Moscow: MPEI Publishing House, 2007. Vol. 3. P. 288—289.
- *Stroev, V.A.; Golov, P.V.; Sharov, Yu.V.* System of mathematical models for calculation of the transients in the complex electrical power systems (in Russian) // Elektrichestvo 2007. No 5. P. 2—11.
- *Stroev, V.A.; Golov, P.V.; Sharov, Yu.V.* Various representations of the automatic controllers of a synchronous generator excitation in calculations of the transients (in Russian) // MPEI Vestnik, 2007. No 2. P. 77—81.

- *Stroev, V.A., Kuznetsov, O.N., Sharov, Yu.V.* New approach to SMES optimal control of transients in electrical power systems // Proc. of Intern. conf. on energetic. Lausanne, 2007, report 216.
- *Stroev, V.A.; Glazunov, A.A.; Sharov, Yu.V.* Electrical supplying systems are the subsystems of electrical power systems (in Russian) // Electrichestvo. 2007. No 9. P. 5—8.
- *Filippova, N.G.* Development and perfection improving of methods of the static stability analysis and synthesis of the dynamic properties of the electric power pools (in Russian) // Electrichestvo. 2007. No 9. P. 26—33.
- *Grechnevikov, I.N.; Filippova, N.G.* Calculation of a dynamic stability of the complex electrical power systems in view of the emergency control devices (in Russian) // Proc. of XIII Conf. of graduate and PhD students "Radioelectronics, electrical and power engineering". In 3 volumes. Moscow: MPEI Publishing House, 2007. Vol. 3. P. 247—248.
- *Krivtsov, A.N.; Filippova N.G.* Modelling and investigation of the long time transients in the electric power pools (in Russian) // Ibidem. P. 252—253.
- *Poludnitsyn, P.J.; Stroev, V.A., Sharov, Yu.V.* Application of the Duhamel integral in the calculations of transients and dynamic stability in the electrical power systems (in Russian) // Ibidem. P. 260—261.
- *Shvedov, G.V.; Tul'skiy, V.N.; Nasyrov, P.P.* Actual problems of the reactive power compensation in the distributive networks (in Russian) // All-Russian conf. «Compensation of reactive power and normalization voltage levels is a technology of reliability increase of electric consumer supplyand economic efficiency of he electric power transfer». Moscow: OAO "RAO United Power Systems" , Russia, 2008.
- *Sharov, Yu.V.; Zelenokhat, O.V.* Increase of a control efficiency of a synchronous generator excitation under the severe disturbances in an electrical power system (in Russian) // Izveztiya vuzov. Problems of power industry. 2007. No 7—8. P. 29—36.
- *The Electrotechnical* encyclopedia: in 4 Volumes (in Russian) / Under edition of A.F.Djakov. Vol. 2 :Edition team: V.YA. Bespalov, M.A.Boev, P.A.Butyrin, et al. Moscow: MPEI Publishing House, 2008. 430 p.
- *Bases* of modern power engineering: the textbook for universities. In 2 Volumes. Vol. 2. Modern electric power industry (in Russian) / Under edition of A.P. Burman and V.A. Stroev. — 4 edition. Moscow: MPEI Publishing House MPEI. 2008. 632 p.
- *The Terminological* directory on the power industry (in Russian). Moscow: "KEM Publisher", 2008. 912 p.

Patents

- *Patent 2310940 RF.* Electric reactor with a superposed magnetization / A.M. Briantsev // BI. 2007. No 32.
- *Patent 2324250 RF.* Electric reactor with a superposed magnetization / A.M. Briantsev // BI. 2008 No 13.
- *Patent 2324251 RF.* Electric reactor with a superposed magnetization / A.M. Briantsev // BI. 2008. No 13.
- *Patent 2335056 RF.* Static compensator of a reactive power / A.M. Briantsev // BI. 2008. No 27.
- *Patent 2337424 RF.* Static compensator of a reactive power / A.M. Briantsev // BI. 2008. No 30.

Dissertations

- *Ebadian Mahmud.* Development and application of the mathematical models for calculation of the steady-state and dynamic operation conditions of EPS, containing the devices of operated shunt compensation: Cand . Sci. (Techn). Dissertation. 2007.

- *Korotchenko V.V.* Development the actions for increase the efficiency of the synchronous turbo-generators performance in an electrical power system under consumption of reactive power: Cand . Sci. (Techn). Dissertation. 2007.
- *Golov P.V.* Development of a methodical and algorithmic research base for the electromechanical transients in the controlled electrical power systems: Cand . Sci. (Techn). Dissertation. 2007.
- *Zelenokhat O.N.* Development of the operating algorithms for synchronous generators excitation for damper angle oscillations after the severe disturbance in the electrical power system: Cand . Sci. (Techn). Dissertation. 2007.
- *Nguen Tkhi Khan.* Development of an algorithm of the discrete control for an asynchronized run in the two-subsystem of an electrical power system: Cand . Sci. (Techn). Dissertation. 2008.
- *Nguen Din Dyk.* Development of a investigation technique of spreading the high harmonics in the electrical power systems: Cand . Sci.(Techn). Dissertation. 2008.

Partners

- JSC «Federal Grid company ENES», (ISC «FSK ENES»), Moscow
- JSC»Tomskneft» TNK (Tomskaya oil company)
- JSC»Energoservis»-Yugra, Niznevartovsk
- JSC»Intertekhelektro»
- JSC «Tyumenenergo»
- JSC «Dalnevostochnaya distribution grid company» (JSC «DRSK»)
- JSCOAO»Tyumenenergo»
- JSC P&DA «Eletex « Kazakhstan
- JSC «ASNMK-519», Kazakhstan
- JSC «System operator of United power system» (JSC «SO EES»)
- JSC «Electroenergetiki»

Unique equipment

- Electrodynamic (physical) model of an electrical power system
- Automated system for the dispatcher control of the distribution networks (the technical facilities and software)
- Devices and systems for monitoring and analysis of an electric energy quality
- The system of automatization of the electrical physical experiment for electrodynamic (physical) model.

HIGH-VOLTAGE ENGINEERING AND ELECTROPHYSICS (HVEEF) DEPARTMENT

Ph.: (495) 362-7660, Ph/fax: (495) 362-7395,
E-mail: hvd@fee.mpei.ac.ru

At HVEEF Department:
25 teachers,
9 researcher,
4 Ph.D. students.

Head of Department
Ph. D. (Techn.),
Alexey B. KALININ

Main lines of research

Research Supervisor

- **Investigation of an electric strength of the high-voltage energy equipment isolation. High-voltage equipment testing**
  Associated-Professor Pintal' Yu.S.
- **Lightning protection of the constructions, the energetic objects and the flying vehicles**
  Associated-Professors Kuzhekin I.P., Temnikov A.G.
- **Pulse Testing Equipment**
  Associated-Professor Kuzhekin I.P., Leading researcher Borisov R.K.
- **Diagnostic methods for an inherent insulation of the high-voltage equipment**
  Professor Krivov S.A., Associated-Professor Pintal' Yu.S., Senior researcher Khrenov S.I
- **Design of an internal isolation of the power transformers and reactors**
  Senior Lecturer Larin V.S.
- **Overvoltages in the electric systems and protection against it**
  Senior lecturer Matveev D.A.
- **Development of software for solution of the applied electrical power engineering problems**
  Senior Lecturers Matveev D.A., Kalugina I.E.
- **Investigation of a corona discharge in air and its technological application**
  Professor Vereschagin I.P.
- **Investigation of the electric-physical processes at surface and barrier discharge in gases and its technological application**
  Professor Krivov S.A., Leading Researcher Sokolova M.V.
- **Mathematical modeling and calculations of the electric fields**
  Professor Vereschagin I.P., Associated-Professor Beloglovskiy A.A.
- **Investigations of the electric-physical processes in discharges from an artificial cloud of a charged water aerosol**
  Associated-Professor Temnikov A.G.
- **Diagnostic methods for the grounded sub-station devices**
  Senior Researcher Zharkov Yu.V.
- **Modeling and investigations of the discharge phenomena in the electrically active clouds using the strongly charged aerosol formations**
  Associated-Professor Temnikov A.G.
- **Electromagnetic compatibility on the electric power engineering objects**
  Associated-Professor Kuzhekin I.P., Leading Researcher Borisov R.K.
- **Instigation of the applying processes for the charged powder materials in a static electrical field**
  Senior Researcher Khrenov, S.I.

- **Electrostatic separation of the free-flowing materials**

  Professor Krivov S.A.
- **Technological electrostatics and protection against a static electricity**

  Professor Krivov S.A.

Agreements, contracts, projects supported by the state budget

- Development of the new methods for calculation and estimation the influence of a streamer corona on the power engineering equipment operation and the methods of reduction its influence
- Development and delivery of a moveable generator of the pulse currents
- Model development of the electromagnetic influence upon the starting and technical complex equipment under switching in the power equipment, an electrical supply system and at the lightning discharges. Execution of calculations
- State contract No 02.516.11.6023 «Development of technological fundamentals of the urgent diagnostics of an electrical equipment» of Federal target program «Research and development on the priority directions of Russian scientific-technological complex development at 2007—2012».
- Development and experimental research of the controlled plasma-chemical reactor of the charged and chemically active particles on the basis of a surface-volumetric discharge
- Investigation of the main (final) discharge stage from the artificial clouds of the charged water aerosol as the analogue of the natural lightning main stage
- Development of the mathematical models and calculation methods for a pulse steamer corona
- Characteristic research and requirements development to the high-voltage modules for an equipment complex for the fine gas cleaning against the harmful admixtures
- Development of an experimental complex for physical modeling of the lightning defeat processes for the power engineering objects and investigation of effectiveness of the various lightning protection facilities with the help of the artificial clouds of a charged aerosol
- Development of the individual measuring system for complex influence of the electromagnetic field of industrial frequency (50 Hz) upon the electrical personnel
- Experimental researches of a pulse electrical strength for inlets with RIP-isolation
- Investigations of a corona discharge in the air under the complex electrode form
- Testing and reliability inspection of the high-voltage spray-type equipment
- Research of the corona current ratio for the band-needle-shaped ionizing electrodes under their displacement in the gas electric filter path from the symmetrical position
- Experimental investigation of a grounding device and the lightning protection condition with purpose to eliminate electromagnetic interference in a power supply of the technological equipment in the communication objects
- Analysis approach for the absorbing characteristics of the transformer equipment isolation for estimation the polymerization degree and the moisture content in hard isolation of the power transformers
- Technological basis development for the urgent diagnostics of the electrical equipment
- Characteristic analysis of the charged aerosol formations, the methods for their formation and evolution. Choice of creation approach for an electric charge of the aerosol formations. Development of a construction variant
- Investigation problem formation for determination of the rejector failure reasons on the electric line of 35-750 kV

- Experimental investigations of the lightning protection system condition
- Exploratory design of the protective devices and electromagnetic compatibility (EMC) on Moscow substations for the automatic equipment overloading restriction and development a part of the project for EMC level
- Materials preparation to the conference "Electrical equipment and technologies for energetic" in Belgrade, Serbia
- Development of the multi-functional software complex for lightning protection calculation of the power engineering objects
- Development of the electromagnetic effect models on the equipment of starting and technical complexes at switching in the power equipment, an electric supply systems and at the lightning discharges
- Development of methods and technical means for solution the problems of electromagnetic compatibility of an electric stations and substations with the up-to-date control and protection systems
- Experimental determination of the permissible testing strength in RIP-isolation of capacity type

Key publications

- *Vereschagin, I.P.; Sokiolovskiy, V.A.* Conditions for micro-organisms inactivation in the unipolar corona discharge (in Russian) // Elektrichestvo. 2007. No 2. P. 2—6.
- *Kurbanov, E.D.; Kalenikov, A.V,; Kuzhekin, I.P.* Water treatment by the strong electrical fields and impulse discharges // Proc. of XXVIII Intern. Conf. «ICPIG-2007». Prage, 2007. P. 1510—1511.
- *Kurbanov, E.D.; Kuzhekin, I.P.* Physical processes in a solid gas under influence of the nano-second pulses of the high voltage (in Russian) // Problems of Energetic. No 3. P. 60—68.
- *Local* and non-local criteria of electron running off in the solid gases and in the solid dielectrics under influence of the short high-voltage pulses (in Russian) / E.D. Kurbanov, I.P. Kuzhekin, A.M. Gashimov, A.C. Bondiakov // Fisika. 2007. V. 8. No 5. P. 3—8.
- *Experience* and prospects of the high-voltage generator creation for 110-500 kV voltage (in Russian) / A.V. Ivanov-Smolenskiy; Yu.S. Pintal', V.A. Kuznetsov et al. // Elektrichestvo. No 10. P. 11—17.
- *Experimental* investigation of the surface micro-discharges in air (in Russian) / M.V. Sokolova; K.V. Kozlov; S.A. Krivov et al. // MPEI Vestnik. 2008. No 6. P. 82—87.
- *Temnikov, A.G.; Sokolova, M.V.; Orlov, A.V.* Experimental investigation of characteristics of an impulse streamer corona stem using an artificial cloud of the charged aerosol // Contr. papers of 11-th Inter. Symp. on High Pressure Low Temperature Plasma Chemistry (HAKONE 11), Oleron Island. France, 2008. Vol. 1. P. 41—45.
- *Krivov, S.A.; Sokolova, M.V.* Influence of Surface Charges on Electric Field Distribution in Gas near Dielectric Surface // Ibidem. P. 51—54.
- *Spatially* and temporally resolved emission spectroscopy of the localized surface discharge in dry air / M.V. Sokolova, K.V. Kozlov, S.A. Krivov et al // Ibidem. P. 55—59.
- *About* the electric field strength influence on streamer branching in the positive streamer corona in air (in Russian) / A.A. Beloglovskiy, G.Z. Mirzabekian, I.V. Pashinin et al. // Elektrichestvo. 2008. No 1. P. 25—30.
- *Roddatis, V.K.; Smirnov, Yu.M.; Temnikov, A.G.* Localization of the large-scale pollution into atmosphere (in Russian) // Grazhdanskaya zashita. 2007. No 5. P. 30.
- *Experimental* investigations of the positive leader velocity dependence on the current at starting and through phases of a leader process (in Russian) / M.G. Andreev; E.M.

Baselian; M.U. Bulatov; I.P. Kuzhekin; L.M. Makal'skiy; D.I. Sukharevskiy; V.S. Sysoev // Fisika plazmy. 2008. V 34. No 7. P. 1—7.

- *Kozlov, D.A.; Kuzhekin, I.P.; Maksimov, B.K.* Overvoltage arrester characteristics (in Russian) // Proc. of X Russian conf. «Electromagnetic Compatibility of technical means and electromagnetic safety». Sankt-Peterburg , 2008. P. 95—99.
- *Electrical* Engineering Encyclopedia (in Russian). In 4 volumes/ Under edition of A.F. Diakov. Vol.2. Editing team: V.Ya. Bespalov, M.N. Boev; P.A. Butyrin et al. Moscow: MPEI Publishing House. 2008. 430 p.
- *Kuzhekin, I.P.* Fundamentals of an electromagnetic compatibility of the modern power engineering equipment (in Russian). Moscow: MPEI Publishing House, 2008. 144 p.
- *Development* of the electrophysical method of the aero-ion cleaning of the gas media (in Russian) / A.M. Temnikov, A.M. Posazhennikov, P.N. Martynov et al. // Proc. of Conf. «Air-2007». Sankt-Peterburg, Russia, 2007.
- *Characteristics* of the discharge final stage from an artificial cloud of the charged aerosol of negative polarity (in Russian) / A.G. Temnikov, A.V. Orlov, L.L. Chernenskiy et al. // Proc. of VI Russian conf. on atmospheric electricity. Nizhniy Novgorod, 2007. P. 153—154.
- *Peculiarities* of formation of the final (main) stage of discharge from the system of two artificial clouds of the charged water aerosol (in Russian) / A.G. Temnikov, A.V. Orlov, L.L. Chernenskiy et al. // Ibidem. P. 155—156.
- *Isolation* diagnostics for a high-voltage equipment on the basis of the absorption characteristics (the past, the present and the prospects) (in Russian) / A.A. Gusev; L.A. Darian; M.A. Koshelev et al. // Proc. of conf. TRAVEK / «Effort consolidation of poswer engineering and electrical engineering under condition of investment growth. Prospects of technology and electrical equipment». 2008.
- *Problems* of determination of the permissible strengths in RIP—isolation of capacitor type (in Russian) / K.G. Sipilkin, S.D. Kassikhin, V.N. Ustinov et al. // Proc. of the plenary session of the «Public Council on power equipment diagnostics». Ekaterinburg, 2008.
- *Sokolova, M.V.; Krivov S.A.* Electrophysical processes in gas isolation (in Russian). MPEI Publishing House, 2008. 112 p.
- *About* the electric field influence on streamer branching in a positive streamer corona in the air (in Russian) / A.A. Beloglovckiy, G.Z. Mirzabekian, I.V. Pashinin et al. // Elektrichestvo. 2008. No 1. P. 25—30.

Dissertations

- *Pashinin I.V.* Perfection of methods for the field and particle motion calculation in the problems of a pulse streamer corona: Cand. Sci. (Techn). Dissertation. 2007.
- *Larin V.S,* Research and development of the effective method for the internal isolation electrical strength calculation of the power transformers: Cand. Sci. (Techn). Dissertation. 2007.

Partners

- Federal state unitary enterprise «State Scientific Center — Leipunskiy Physical Energetic Insitute», Moscow
- JSC Innovatiobn in Energetic, Moscow
- State Unitary Enterprise «All-Russia Electrical Engineering Institute named after Lenin», Moscow
- JSC ElectroZavod
- JSC ElStar

- JSC Elnap, Moscow
- D.O.O. «Iskra Zascite», Lubliana, Slovenia
- Design Bureau of transport machinery, Moscow
- JSC Massa, Moscoe region
- JSC Center of electric power engineering
- JSC Barkov Plant "Isolator", Moscow
- JSC R&DI GAS, Moscow
- JSC Condor Eco, Moscow

Unique equipment

- Generator of a pulse voltage 1000 kV (certified)
- Source of an alternative current — WP 200/400 kV (certified)
- Generator of the lightning current four-component (certified)
- Generator of a charged aerosol
- Setup for measurement of the partial discharges in insulation
- Generator of high frequency for 300 kV 100 kHz (GVCH 300/100)
- Generator of the nanosecond pulses with voltage 100 kV with pulse duration 300 ns (GIN 100/350)
- Generators of a pulse current 8/20; 10/350
- Double formation line for 100 kV
- Scientific-academic complex for electric field and powerful discharge influence investigation upon the organic and biological admixture in the water
- Nano-second pulse generator of high voltage of 100 kV, pulse duration 60—300 nsec

RELAY PROTECTION AND AUTOMATION OF ELECTRIC POWER SYSTEMS (RPAEPS) DEPARTMENT

Ph.: (495) 673-0398, (495) 362-7477,
fax: (495) 673-0398, (495) 362-7477,
E-mail: rzias@fee.mpei.ac.ru

At RPAEPS Department:
22 teachers,
3 researcher,
10 Ph.D. students.

Head of Department
Dr. Sci (Techn.), Professor
Corresp.-Member of RAS
Anatoly F. D'YAKOV

Main lines of research

Research Supervisor

- **Development of the theoretical bases and implementation of the integrated microprocessor systems of he relay protection, automation, control and monitoring of the ultra-high-voltage 330...750 kV power engineering objects**

  Professor D'yakov A.F.
- **Development of the methods and the structure principles for the simulators and the automated educational systems on the relay protection and the power engineering system automation**

  Professor D'yakov A.F., associated-professor Krivenkov V.V.
- **Microprocessor systems of relay protection and automation**

  Associated-Professors Babykin V.V., Barabanov Yu.A., Vasiliev A.N., Klimova T.G., Tiomkina R.V.
- **Software for a short-circuit currents calculation and the CAD systems for the relay protection design**

  Associated-Professor Barabanov Yu.A.
- **Electromagnetic compatibility of a relay protection and the automation microprocessor systems**

  Professor Maksimov B.K., associated-professor Artsishevskiy Ya.L.
- **Complex method development for the damage place detection means in the electric transmission lines**

  Associated- professor Artsishevskiy Ya.L.

Agreements, contracts, projects supported by the state budget

- Development of the determination methods for the stability region boundaries of the own source in the electrical supply systems in megapolises
- Development on the scientific basis of integration of the protection means and the automatic control systems in the electrical power systems
- Electrical supply reliability provision and operation stability ensuring of the technological installations under the external electric supply failures
- Development of the combined application methods of the facilities for a failure places determination for improvement of an electrical grid reliability

Key publications

- *D'yakov, A.F.; Maksimov, B.K.; Kuzhekin, I.P.; Temnikov, A.G.* Electromagnetic compatibility and lightning protection in the electrical power engineering (in Russian). Moscow. MPEI Publishing House. 2008. 649 p.

- *D'yakov, A.F.; Ovcharenko, N.I.* Micro-processor automation and relay protection of the electrical power systems (in Russian). Moscow. MPEI Publishing House. 2008. 630 p.
- *D'yakov, A.F.; Berliavskiy, G.P.; Kantsedalov, V.G.* High-speed works and the technological accessories for distant diagnostics of the lengthy pipelines (in Russian) // Energetik. 2007. No 10. P. 2—9.
- *Artsishevskiy, Ya.L.; Bayar Bat-Erdene; Dzhamsran Arclan.* Perfection of the failure location determination system in the electric lines (in Russian). // Proc. of II Intern. Forum on strategy technologies. UlaanBaatar. Mongolia, Oct. 3—5. 2007. P. 394—396.
- *Dolgopolov, A.G.* Designing of relay protection for the magnetically controlled reactors (in Russian). // MPEI Vestnik. 2007. No 4. P. 42.
- *Dolgopolov A.G., Ukolov S.V.* Reactores shunt controlables para las redes electricas de alta tension // Primer Seminario de Cigre en Uruguay, 4 al 6 de Novembre, 2007. Montevideo.
- *Artsishevskiy, Ya.L.* Bologna process and an additional professional education of the electric power experts (in Russian) // Proc. of Jubilee Conf "55-years anniversary of Institute of qualification raising of state-service — Innovation Development of Electrical Power Engineering in XXI century». Vol. 4. P. 390—398.
- *Maksimov, B.K.; Molodiuk, V.V.* Electrical plant development problems for the coal orientation (in Russian). // MPEI Vestnik. 2007. No 6.
- *Artsishevskiy, Ya.L.; Zadkova, E.A.* Research and development of actions for providing the loading stability of permanent manufacture on the basis of the effectiveness growth of the relay protection and automatics functioning (in Russian). // Izvestia vuzov. Elektromekhanika. Novocherkassk, 2008. No 3. P. 74—80.
- *Approach* for realization of requirement to relay protection and automatics of electrical supply systems for consumers with the particular complicated technological processes (in Russian). / E.A. Zadkova, Ya.L. Artsishevskiy, Yu.P. Kuznetsov et al. // MPEI Vestnik. 2008. No 4. P. 14—17.
- *Dolgopolov, A.G.* Relay protection and automatics of the linear controlled shunt reactor of 500 kV (in Russian). // Elektrotekhnika. No 2. 2008.
- *Alekseev, O.P.; Maksimov, B.K.* Anti-damage control in the power systems under deep voltage reduction (in Russian). // Energetik. 2008. No 11. P. 2—4.
- *Maksimov, B.K.; Molodiuk, V.V.* theoretical and practical fundamentals of an electrical power market (in Russian). Moscow. MPEI Publishing House. 2008. 292 p.
- *Panfilov, N.I.* Electrical value conversion and the measuring converters (in Russian). Moscow. MPEI Publishing House. 2008. 212 p.
- *Ovcharenko, N.I.* Automatics of the power systems (in Russian). Moscow. MPEI Publishing House. 2007. 476 p.

Dissertations

- *Arslan Zh.* Research and development of the method for an accuracy increase of the two-way determination of the failure locations for the air lines of 110 kV and higher: Cand. Sci. (Techn.) Dissertation. 2007.
- *Zhukov A.V.* Perfection of the technological control systems of the ultra-high voltage nets of the power pools: Cand. Sci. (Techn.) Dissertation. 2008.
- *Zadkova E.A.* Effectiveness growth of the relay protection and automatics functioning for a loading stability providing of the enterprises on permanent manufacture: Cand. Sci. (Techn.) Dissertation. 2008.

Partners

- JSC «Institute Energosetproekt», Moscow

- JSC Syzran' oil-refining plant, Syzran'
- JSC «Federal net company of united energy system», Moscow
- Federal State Unitary Enterprise «Atomenergoproekt», Moscow
- JSC VNIIR, Chaboksary
- «El'ster-metronika», Moscow

Unique equipment

- Setup for testing and adjustment of the automatic synchronizers for connection of the large power synchronous generators on parallel operation with an energy system

NON-CONVENTIONAL AND RENEWABLE ENERGY SOURCES (NCRES) DEPARTMENT

Ph.: (495) 362-7251, (495) 362-7574,
fax: (495) 362-7574,
E-mail: nvie@fee.mpei.ac.ru

At NCRES Department:
18 teachers,
10 Ph. D. students (6 Russian, 4 foreign)

Head of Department
Dr. Sci. (Techn.),
Professor Leonid N. DUDCHENKO

Main lines of research

Research Supervisor

- **The theory and methods for substantiating the parameters of the installations and systems on the basis of the renewable energy sources**
  Professor Vissarionov V.I; Professor Malinin N.K.
- **Theory and methods for substantiating the operating modes of the installations and systems on the basis of the renewable energy sources in the decentralized and centralized power supply systems**
  Professor Vissarionov V.I.; Professor Malinin N.K.
- **Ecological aspects for using the renewable energy sources**
  Professor Vissarionov V.I.; Professor Malinin N.K.
- **Developing the methods of an optimum control of the hydroelectric power station cascades, considering the social-ecological requirements**
  Professor Alexandrovskiy A.Y.
- **Seismic safety of the hydro engineering facilities**
  Professor Dudchenko L.N.
- **Developing the theoretical fundamentals for optimizing the operational modes and the designing controlling systems for the alternating-current machines and their devices on the basis of the non-traditional and renewable energy sources**
  Professor Tsgoev R.S.
- **Management of the projects of the creating complex technical-organizational systems on the basis of the methods and facilities of an information and automation of the project solutions**
  Professor Tiagunov M.G.

Agreements, contracts, projects supported by the state budget

- Developing the methodological fundamentals for substantiating the usage of the wind-driven power plants in the local power supply systems of the autonomous consumers.
- Developing the recommendations for using TNU effectively in the power supply systems for a power and heat conservation.
- Comparative research and feasibility study of using the wind-driven power installations for the power complex on the Kharlov Island.

Key publications

- *Alexandrovskiy, A.Y.; Lubanov, N.Y.* Policy planning of an electrical energy for the hydropower stations at the second quarter, subject to runoff factors (in Russian). // Hydraulic engineering construction. 2007. No. 4. P. 41—47.
- *Anistratov, A.V.; Vissarionov, V.I.* Research of results of the solar modules with the refractive concentrators and the fiber-optic light conduits (in Russian) // MPEI Vestnik. 2007. No. 2. P/ 82—86.

- *Vissarionov, V.I.; Jimo. B.* Small-scale hydropower engineering in Nigeria (in Russian) / / MPEI Vestnik. 2007. No. 3. P/ 93—100.
- *Vissarionov, V.I.; Aba Niankoy.* Contemporary situation and prospects of development of the fuel-energy complex in Guinea (in Russian). // MPEI Vestnik. 2007. No. 5. P. 80—86.
- *Al-Azavi, R.S.; Vissarionov, V.I.* Practical prospects of using the solar energy and an economic evaluation of the solar power engineering for the stand-alone power supply systems (in Russian). // Energy-saving and water treatment. 2007. No. 5. P. 39—40.
- *Alexandrovskiy, A.Y.; Silaev. B.I.* Reference materials for the lecture course projects and the graduation thesis on the hydroelectric power installations (in Russian). / Moscow: MPEI Publishing House. 2007. 51 p/.
- *Malinin, N.K.; Ryzhov, A.V.* Enhancement of the analysis methods for the resources of the small-scale hydro power engineering (in Russian). // MPEI Vestnik. 2007. No. 5, P. 75—80.
- *Alexandrovskiy, A.Y.; Dubinina, V.G.; Katunin, D.N.* Methods for implementing the ecological principles to manage water resources of the Volzhsko-Kamskiy tandem reservoir systems (in Russian). // Proc. of All-Russian Theoretical and Practical Conference «Water resources of the Volga: the present and the future, management problems». Astrakhan, Publishing house «Astrakhanskiy Universitet». 2008. P. 229—232.
- *Anistratov, A.V.; Vissarionov, V.I.; Korneev, N.S.* Solar modules with the refractive concentrators and the fiber-optic light conduits (in Russian). // Energy conservation — theory and practice: Proc. of Fourth International School-Seminar of Young Scientists and Specialists. Moscow. MPEI Publishing House. 2008. P. 229—232.
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- *Vissarionov, V.I.; Shestopalova, T.A.; Yakushov, A.N.* Power supply to noo-sphere community from the renewable sources of energy (in Russian) // Ibidem. P. 247—251.
- *Analysis* methods of the resources of the renewable sources of energy (in Russian) / A.A. Burmistrov, V.I. Vissarionov, G.V. Derugina et al., edited by V.I. Vissarionov. Moscow: MPEI Publishing House. 2007. 144 p
- *Solar* power engineering: teaching aid (in Russian) / V.I. Vissarionov, G.V. Derugina, V.A. Kuznetsova et al., edited by V.I. Vissarionov. Moscow: MPEI Publishing House. 2008. 322 p
- *Tsgoev, R.S.* Comparing the controlled-operating possibilities of the wind driven power plants (in Russian). // Elektrotekhnika. 2007. No. 12. P. 32—38.
- *Tsgoev, R.S.* Controlling induction machine with the brushless diode excitation system (in Russian) // Elektro. 2008. No. 6. P. 17—21.
- *Vissarionov, V.I.; Vlasov, P.P.; Kuznetsov, N.M.* Integrated use of the energy resources in the mining plants (in Russian) // Gorniy Zhurnal. 2008. No. 4. P. 81—91.

Patents

- *Pat 74969 RF.* Wind turbine installation. / V.I. Vissarionov, M.V. Geriyatovich. 2008.

Partners

- JSC «RUSGIDRO», Moscow
- JSC «Research and Development Institute of Power Installations», Moscow
- All-Russian Research and Development Institute of Agriculture Electrification, Moscow

- JSC «NPO Lianozovskiy Electro-Mechanical Factory»
- Technical High School, Constanz, Germany
- JSC «INVEL», Moscow

Unique equipment

- Floating Aeratic Installation power supplied by the solar batteries.

THEORETICAL FOUNDATIONS OF ELECTRICAL ENGINEERING (TFEE) DEPARTMENT

Ph/fax: (495) 673-4251,
fax: (495) 673-4251,
E-mail: TOE-all@mpei.ru; TOE@mpei.ru

At TFEE Department:
23 teachers,
3 Ph.D. students.

Head of Department Dr. Sci. (Techn.),
Professor, Corresp.-Member of RAS,
Winner of RF Government Award Pavel A. BUTYRIN

Main lines of research

Research Supervisor

- **Theory and calculation methods of the electromagnetic fields and the electrical circuits**
  Professor Demirchyan K.S.
- **Fundamental problems and the theories of an electromagnetic field**
  Professor Demirchyan K.S.
- **Theory and application practice of the virtual instruments in the electrical engineering**
  Professor Demirchyan K.S.
- **UHF electrodynamics**
  Professor Alekseichik L.V.
- **Theory and realization of the electrodynamic adaptive systems**
  Professor Butyrin P.A.
- **Creation of the adaptive electrodynamic systems for an ozone electric synthesis**
  Professor Gusev G.G.
- **Theory, methods and devices for the electromagnetic energy conversion**
  Associated-Professor Shakirzyanov F.N/
- **Diagnostics and identification of the electrical engineering and the electrical power objects parameters**
  Professor Butyrin P.A.
- **Theory and calculation methods of the non-linear circuits**
  Associated-Professor Karataev V.V.

Agreements, contracts, projects supported by the state budget

- Theory development of the destabilizing disturbance localization for the electrical engineering and the electrical power systems
- Development of methods and the virtual tools for parameter identification of the electrical engineering devices on the basis of the experimental data
- Investigation of an external and internal magnetic field influence on the properties of the composite materials with magneto-striction losses contenting the micro- and nano-particles
- Development of the theoretical basis of diagnostics and the adaptive control for the electrical engineering systems with the disturbing perturbations
- Development of the structure principles of diagnostics and an adaptive control complex for the electrical engineering systems with the disturbing perturbations
- Inspection of an electromagnetic situation in a operating medium of the monitoring systems for a high-voltage equipment

- Development of the diagnostic approach for the transformers under loading on the basis of the operating currents and voltages
- Development of a complex method for the failure location detection for the high-voltage and ultra-high-voltage lines

Key publications

- *Demirchyan, K.S.* Charges motion in the four-dimensioned space by Maxwell and Einstein (in Russian). Moscow: IBRAE Publisher. 2008.
- *Shakirzyanov, F.N.* Some problems of the giant energy electrodynamics (in Russian) // Elektrichestvo. 2008. № 1. P. 41—47.
- *Kirenskiy, V.V.; Liakhomskiy, A.V.; Shakirzyanov F.N.* Co-ordinate determination of the leakage location by parameters of the input conductivity and resistance increments (in Russian) // Elektrichestvo. 2008. No 4. P. 55—57.
- *Makarevich, L.V.; Shifrin, L.N.; Alpatov, M.E.* Modern tendencies in creation and diagnostics of the power transformers of large power (in Russian) // Izvestia RAN. Series Energetic. 2008. No 1. P. 45—69.
- *Butyrin, P.A.; Peshkov, I.B.* The role of the social expectations, an education, a science in implementation of the projects of the electrical power engineering reformation (in Russian) // Izvestia akademii elektrotekhnicheskikh nauk RF. 2008. No 1. P. 4—11.
- *Butyrin, P.A.* Is there the future for the Russian electrical engineering education and science (in Russian) // Energoekspert. 2008. No 3. P. 38—41.
- *Butyrin, P.A.* Electrical engineering education in Russia: the past, the present, the future (in Russian) // Cables and wires. 2008. No 4 (311). P. 9—12.
- *Butyrin, P.A.* Social aspects of the electrical engineering projects (in Russian) // Izvestia akademii elektrotekhnicheskikh nauk RF. 2008. No 2. P. 7—14.
- *Butyrin, P.A.* Electrical engineering and a society: interacted development (in Russian) // Izvestia RAN. Energetic. 2008. No 6. P. 49—70.
- *Korenskiy, V.V., Karataev, V.V.; Shakirzyanov F.N.* Device for determination of the failure locations and the resistance to leakage current in the power circuits (in Russian) // Elektrichestvo. 2008. No 5. P. 53—56.
- *Demirchyan, K.S.; Butyrin, P.A.* Problems of conservation and development of the electrical engineering industry of Russia (in Russian) // Izvestia RAN. Energetic. 2008. No 1. P. 5—17.
- *Butyrin, P.A.* About one pre-revolution publication in journal Elektrichestvo (in Russian) // Elektrichestvo. 2008. No 9. P. 69.
- *Zolotukhin, I.A.; Karataev, V.V.* Analysis of the excitation process of the combination oscillations in the two-tuned circuit in the Van der Pol's space (in Russian) // Proc. of intern. Conf. "Information facilities and technologies — 2007". Vol. 1. Moscow: MPEI Publishing House, 2007. P. 79—82.
- *Zolotukhin I.A.; Karataev, V.V.* Application of LabVIEW packet for creation of an excitation pattern in the Van der Pol's space (in Russian) // Proc. of VI Intern. Conf. «Education, scientific and engineering applications in LabVIEW medium and technologies. Vol. 1. Moscow: UDN Publisher, 2007. P. 166—168.
- *Elistratova, V.I.; Karataev, V.V.* For R-L one-port circuit, the automation of a state equation formation for investigation of transients in the LabVIEW medum (in Russian) // Proc. of XIV Intern. conf. of graduate and PhD students "Radio-electronics, electrical and power engineering". In 3 volumes. Moscow. MPEI Publishing House. 2008. P. 158—159.
- *Elistratova, V.I.; Karataev, V.V.* Approach to a state equation formation for the power supply circuit for the powerful magnetic installations (in Russian) // Ibidem. P. 344—345.

- *Butyrin P.A.; Tolcheev, O.V.; Shakirzyanov F.N.* Electrical engineering (in Russian) // Moscow: Publishing House «Academia», 2007. P. 268.
- *Alekseichik, L.V.* Ultra-high-frequency interacted systems on the basis of the dielectric resonators (in Russian) // Elektrichestvo. 2008. No 2. P. 54—59.
- *Alekseichik, L.V.* Investigations of the electrical physical parameters of thin films and the film coverings by means of a dielectric UHF resonator (in Russian) // Elektrichestvo. 2008. No 7. P. 54—59.

Dissertations

- *Zolotukhin I.A.* Oscillation analysis in the multi-circuit electrical models of the thermal-hydraulic systems: Cand. Sci. (Techn.) Dissertation. 2008.

Partners

- Division of mechanics, machinery, control processes and energetic of RAS, Moscow
- Academy of Electrical Engineering sciences, Moscow
- «Ekologicheskiy Centr zavoda Khrunicheva» company, Moscow
- United Institute of Nuclear research, Dubna
- Sankt-Peterburg State Technical University

Unique equipment

- Hardware-software complex LabVIEW
- Practical educational complex on the lecture course "Theoretical bases of Electrical Engineering"

HIGHER MATHEMATICS (HM) DEPARMENT

Ph.: (495) 362-7874, (495) 362-7392, (495) 362-7160
fax: (495) 362-7213,
E-mail: VM-all@mpei.ru; VM@mpei.ru

At HM Department:
77 teachers.

Head of Department
Dr. Sci. (Phys-Math.), Professor
Active Member of International Academy of Informatization
Igor M. PETRUSHKO

Main lines of research

Research Supervisor

- **Equations with the partial derivatives**
  Professor Petrushko I.M.
- **Homologous and structural ring theory and the arithmetical properties of the analytic function values**
  Professor Tuganbaev A.A., associated-professor Yanchenko A.Ya.
- **Branching processes in a random environment**
  Professor Afanas'ev V.I.
- **Harmonic analysis, code theory, approximations**
  Professor Yudin V.P.
- **Functional analysis**
  Professor Kirillov A.I.
- **Asymptotic integration methods development for the singularly perturbed differential, integral and integral-differential systems of the linear and non-linear equations**
  Professors Prokhorenko V.I., Safonov V.F., Bobodzhanov A.A.
- **Non-linear differential equations of an infinite order and the appropriate Banach spaces**
  Professor Balashova G.S.
- **Inverse problems for the differential equations**
  Professor Barashkov A.S.

Agreements, contracts, projects supported by the state budget

- Some issues of a qualitative theory of the differential equations and the function theory extreme problems
- Investigation of the non-classical tasks for an equation with the partial derivatives in the weight spaces

Key publications

- *Zav'ialov, B.I; Drozhzhipov, Yu.N.* Asymptotically quasi-homogeneous general functions (in Russian) // Doklady RAN. 2008. V. 421. No 2. P. 157—161.
- *Petrushko, I.M.; Makal'skiy, L.M.* About the parameter changing of the aerosol systems (in Russian) // Coll. of papers of Moscow regional division RAEN on environment ecology monitoring. 2008. Issue II.
- *Tuganbaev, A.A.* Rings of the squint Loran series and a maximum condition for the right-hand annulets (in Russian) // Discrete mathematics. 2008. V. 20. Issue 1. P. 80—86.
- *Yudin, V.A.* The best approximation on the monomials on a cube (in Russian) // Mathematical Collection. 2008. V. 199. No 8. P. 149—160.
- *Higher* mathematics course. Multiple integrals. Vector analysis: Lectures and practical works (in Russian) // Sankt-Peterburg: Lan' Publisher, 2007. 320 p.

- *Afanas'ev, V.I.* Galton-Watson process under condition of a high level achievement (in Russian) // Probabilities theory and its application. 2007. V. 52. Issue 3. P. 588—594.
- *Afanas'ev, V.I.* Central limit theorem for a weight of the random representation superposition (in Russian) // Review of applied and industrial mathematics. 2007. V. 14. Issue 5. P. 825—826.
- *Afanasyev V.I.* New invariance principles for a critical branching process in the random environment // Proc. of the XII Intern. Conf. on Applied Stochactic Models and Data Analysis / Prof. Christos H. Skiadas (Ed.), Chania (Greece), 2007. 5 pages.
- *Afanasyev V.I.* Invariance principles for the critical Galton-Watson branching process / / Transactions of the XXVII Intern. Seminar on Stability Problems for Stochactic Models / Prof. Zeev Volkovich (Ed.), Karmiel (Israel), 2007. P. 8—13.
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- *Gevorgyan P.S.* Uniformly movable categories and uniform movability of topological spaces. Bull. Polish Acad. Sci. Math., (55) 2007. P. 229—242.
- *Zimina, O.V.* On a role of tasks in the higher mathematics education (in Russian) // Proc. of All-Russia conf. dedicated to 115-anniversary of corr-member P.A. Larichev «Tasks in mathematics education: theory, experience, innovations». Vologda: RUS' Publisher, 2007. P. 99—104.
- *Zimina, O.V.* Yan Amos Kamenskiy and modern education (in Russian) // Coll. of papers «Mathematics in education». Cheboksary: Chuvash University Publisher, 2007. Issue 3. P. 175—191.
- *Kirillov, A.I.* On pedagogical science remarking (in Russian) // Ibidem. P. 192—219.
- *Tuganbaev, A.A.* Rings over which all modulus are semi-regular(in Russian) // Fundamental and applied mathematics. 2007. Issue 13. No 2. P. 185—194.
- *Tuganbaev, A.A.* Distributive extensions of modules over noncommutative rings // J. Math. Sci. (New York). 2007. T. 143. № 5. P. 3509—3516.
- *Tuganbaev, A.A., Krylov, P.A.* Modules over discrete valuation domains. I. // J. Math. Sci. (New York). 2007. T. 145. № 4. P. 4997—5117.
- *Yudin, V.A.* About the polynomials the least deviated from zero (in Russian) // Mathematical notes. 2007. V. 82. Issue 4. No 10. P. 631—636.
- *Afanas'ev, V.I.* Invariance principle for a critical branching process in a random medium which achieves a high level (in Russian) // Probabilities theory and its applications. 2008. V. 54. Issue 1. P.15.
- *Afanas'ev, V.I.* About global characteristics of a critical branching process in a random medium (in Russian) // Review of applied and industrial mathematics. 2008. V. 15. Issue 4. P. 692—693.
- *Barashkov, A.S., Petrosian, L.S.* The Method of Prime Costs Determination of the Model Row Gooda // Nonlinear Analysis: Modelling and Control. 2008. Vol. 13. № 3. P. 325—330.
- *Gontsov, R.R.* About the solutions of the Schlesinger equation in the Malgrange teta-divisor vicinity (in Russian) // Mathematical notes. 2008. V. 83 (5). P. 779—782.
- *Gontsov, R.R.; Poberezhnyy, V.A.* Various variants of the Riemann-Hilbert problem for the linear differential equations (in Russian) // UMN. 2008. V. 63 (4). P. 3—42.
- *Zav'yalov, B.I.; Drozhzhipov, Yu.N.* Asymptotic quasi-homogeneous general functions (in Russian) // Doklady RAN. 2008. V. 421. No 2. P. 157—161.

- *Zav'yalov, B.I.; Drozhzhipov, Yu.N.* Tauber theorems application in the several problems of the mathematical physics (in Russian) // TMF. 2008. V. 157. No 3. P. 373—390.
- *Oganesian A.G.* Quark distributions in the QCD sum rules: Unexpected features and paradoxes // Phys. Atom. Nucl. 2008. № 71. P. 1439—1444,.
- *Yudin, V.A.* The best approximation of the monomials on a cube (in Russian) // Mathematical Collection. 2008. V. 199. No 8. P. 149—160.

Partners

- Lomonosov Moscow State University
- Steklov mathematical Institute of RAS, Moscow
- Moscow State Social University
- Russian scientific Center «Kurchatov Institute», Moscow

INSTITUTE OF AUTOMATICS AND COMPUTER ENGINEERING (IACE)

Institute Director

Ph.D. (Techn.), Associated-Professor
Valery P. LUNIN
Ph.: (495) 362-7664
Fax: (495) 673-2872
E-mail: AVTFDEK-all@mpei.ru,
AVTFDEK@mpei.ru

Institute Departments

IACE CONTROL AND INFORMATICS (CI) DEPARTMENT

Ph. : (495) 362-7407,
E-mail: admin@dci.mpei.ru

At CI Department:
29 teachers,
11 researchers,
25 Ph.D. students.

Head of Department
Dr. Sci. (Techn.)
Professor Valery M. BESEDIN

Main lines of research

Research Supervisor

- **Development of the mathematical models and the control algorithms for the complicated objects**

  Professor Derzhavin O.M.

- **Development of the mathematical methods and the automation facilities for investigation and design of the non-linear dynamic systems and processes**

  Professor Kolosov O.S.

- **Development of the information technologies in real time on the basis of the artificial neuron networks and the self-organization principles**

  Professor Filaretov G.F.

- **Automation facility development on the basis of the modern programmable controllers, an optimization and modeling of the dynamic systems**

  Professor Kolomeitseva M.B.

- **Development of the adaptive and optimal control systems for the complicated dynamic systems**

  Professor Egorov S.V

- **Investigation of the decision making support methods on the basis of a statistical analysis of the heterogeneous data. Development of the information protection methods**

  Professor Borodiuk V.P., Associated-Professor Fomin G.A.

Agreements, contracts, projects supported by the state budget

- Development of a theory and the design methods for the information and control systems
- Development of the synergetic control algorithms for the non-linear dynamic systems
- Development of the model creation methods and the controlled objects optimization on the observation data
- Development of the synthesis methods for the artificial neuron nets to detect the spontaneous variation of the random processes characteristics
- Development of the parametric and structure identification algorithms of the linear objects
- Development of the mathematical and software provision for solving the imitation modeling problem of the continuous dynamic systems with an interval uncertainty
- Investigations of the decision making support methods on the basis of a statistical analysis of the heterogeneous data

Key publications

- *Anisimov, D.N.; Piskunova, Yu.Yu.* Application of the non-functional conformities at development of the fuzzy control systems (in Russian) // Mechatronics, automation, control. 2007. No 3. P. 18—21.
- *Anisimov, D.N.; Shevchenko, M.B.* Estimation of a non-linearity influence at identification of the dynamic objects (in Russian) // Mechatronics, automation, control. 2007. No 7. P. 21—24.
- *Anisimov, D.N.; Khripkov, A.V.* Estimation distribution laws for the dynamic object parameters at identification by the exponential modulation method (in Russian) // Control problems. 2007. No 4. P. 14—18.
- *Tolcheev, V.O.* A synthesis of the decision rule sets for classification execution of the text documents (in Russian) // Information technologies. 2007. No 10. P. 32—38.
- *Mal'tsev, P.P.; Stiazkin, V.B.; Tolcheev V.O.* About the application experience of the revelation approach for the oriented journals (in Russian) // Information technologies. 2007. No 7. P. 65—71.
- *Avshalumov, A.Sh.; Filaretov, G.F.* Detection algorithms of the abnormal observations in the correlated time series (in Russian) // MPEI Vestnik. 2007. No 3. P. 21—25.
- *Smagina, I.A.; Khrizolitova, S.A.* Stability of the precision quasi-multi-channel tracking systems at presence of the non-linear elements (in Russian) // MPEI Vestnik. 2007. No 1. P. 102—106.
- *Van Biao.* The adaptive co-ordinate optimization method on the basis of the principle of an interaction separation (in Russian) // MPEI Vestnik. 2007. No 1. P. 107—113.
- *Derzhavin, O.M.; Sidorova, E.Yu.* About a solution of the problem order reduction on Tikhonov for the non-linear dynamic system model on the basis of its linear approximation (in Russian) // MPEI Vestnik. 2007. No 2. P. 141—147.
- *Polotnov, M.I.; Fomin, G.A.; Fomina, E.S.* Data preparation for an analysis and data extraction at substantiation of the control solutions (in Russian) // MPEI Vestnik. 2007. No 3. P. 125—129.
- *Borodiuk, V.P.; L'vova, A.V.* Economic effectiveness increase of an information security system (in Russian) // MPEI Vestnik. 2007. No 4. P. 93—98.
- *Nikishin, A.F.* Structural identification of the non-linear dynamic objects and systems with the help of the computational experiment (in Russian) // MPEI Vestnik. 2007. No 3. P. 99—104.
- *Statistical* collection about the activity in the sphere of after-university professional education in 2007 (PhD course and Dr.Sci. course in the system of Ministry of Education) (in Russian) / L.A. Mochalova; M.M. Polotnov; G.A. Fomin et al. Sankt-Peterburg: Polytechnical University Publisher. 2008. 32 p.
- *Mochalova, L.A.; Polotnov, M.M.; Fomin, G.A.; Fomin, K.V.* Distribution procedure of the homogeneous resources between the large number of objects with the account of non-formal knowledge about these objects (in Russian) // MPEI Vestnik. 2008. No 2. P. 100—103.
- *Anisimov, D.N.; Vershinin, D.V,; Kolosov, O.S.; Khripkov.* Application of an adjusted dynamic model of an eye retina in a component analysis for pathology diagnostic by means of the artificial intelligence methods (in Russian) // MPEI Vestnik. 2008. No 5. P. 70—74.
- *Abdymanap, A.* Detection probability estimation in the problem of the spatial search (in Russian) // MPEI Vestnik. 2008. No 2. P. 90—94.
- *Kolosov, O.S.; Garmash, V.B.; Deev, R.V.; Morozov, R.B.* Noise immunity increase and an algorithm effectiveness growth for temperature control of a hot-water supply on

the central heat stations (in Russian) // Mechatronics, automation, control. 2008. No 10. P. 18—23.

- *Lunin, V.P.; Kolosov, O.S.* 50-years anniversary of Institute of Automatics and Computer Engineering (in Russian) // MPEI Vestnik. 2008. No 5. P. 5—15.
- *Filaretov, G.F.; Bakhvalov, L.A.; Repin, D.S.* Traffic analysis algorithms in the corporation computer networks on the basis of the extreme value statistics (in Russian) // Software products and systems. 2008. No 3. P. 112—117.

Dissertations

- *Van Biao.* Research and development of the adaptive co-ordinate optimization methods for the steady-state modes of the control systems: Cand. Sci. (Techn.) Dissertation. 2007.
- *Smagina, I.A.* Structure analysis and development of methods for the quality estimation of the precision electromechanical systems: Cand. Sci. (Techn.) Dissertation. 2007.
- *Shevchenko, O.V.* Research and development of the analysis means for a one class of the satellite observation systems: Cand. Sci. (Techn.) Dissertation. 2007.
- *Kokorev, S.A.* Research and development of a method for the simultaneous estimation of the roots of the linear system characteristic equation: Cand. Sci. (Techn.) Dissertation. 2007.
- *Stefantsov A.G.* Development of an implementation approach for the adapting information-analytic systems: Cand. Sci. (Techn.) Dissertation. 2007.
- *Nikishin, A.F.* Approach to the imitation experiment fulfillment for determination of the structural scheme of the non-linear dynamic object: Cand. Sci. (Techn.) Dissertation. 2008.
- *Kiseliov E.V.* Analysis and synthesis methods development for a fuzzy supervising system for automatic control: Cand. Sci. (Techn.) Dissertation. 2008.

Partners

- «Mosenergo» company, Moscow
- Institute of Radio Engineering and Electronics, RAS, Moscow
- Ilmenau Technical University, Germany
- Chemistry-Technological Institute, Pardubice, Chech Rebublic
- RIA «Mosspetsavtomatika», Moscow
- RIA «Mars», Moscow
- Unique equipment
- Tools package for neuron net investigation and design
- Hardware-software facilities for a scientific research automation and the equipment combined testing
- Equipment complex for investigation in real time of the complicated dynamic objects with the several nonlinear elements
- Technological equipment for investigation and design of the automated control systems for the technological processes

IACE COMPUTER ENGINEERING (CE) DEPARTMENT

Ph.: (495) 362-7145,
fax: (495) 362-5506,
E-mail: VT-all@mpei.ru; VT@mpei.ru,
Internet site: http://vt.mpei.ac.ru

At CE Department:
25 teachers,
5 researchers,
8 Ph.D. students.

Head of Department
Dr. Sci. (Techn.),
Professor Viktor V. TOPORKOV

Main lines of research

Research Supervisor

- **Distributed computations and systems**
  Professor V.V. Toporkov
- **Computer-aided synthesis of the discrete systems and a hardware/ software codesign**
  Professor V.V. Toporkov
- **Modeling, analysis and synthesis of the dynamical systems**
  Professor G.S. Chkhartishvili
- **High-level synthesis**
  Professor I.S. Potyomkin
- **Methods of the memory devices and systems design**
  Professor I.V. Ognev
- **Databases design**
  Professor G.A. Borodin
- **Systems on FPGA's**
  Associated-Professor A.P. Sharapov
- **Information security methods and means**
  Associated-Professor I.N. Andreeva
- **Intelligent systems**
  Associated-Professor M.V. Fomina

Agreements, contracts, projects supported by the state budget

- Scalable computer systems
- Consistent allocation of the computing resources in the globally distributed media
- Complex of the models, methods, facilities for analysis and optimization of the scaled computing systems
- Methods and instrumental tools for the hardware/software co-design
- Methods and tools for a knowledge integration in the CALS-technologies
- Steganographic methods for special applications
- Development of methods and technologies of an automated investigation of the hardware-software complexes of the academic and research purposes
- Regularization of the formal-heuristic procedures for analysis and synthesis of the complex systems
- High-level synthesis based on the UNIX-platforms
- Digital systems design and CAD of VLSI
- FPGA based system design
- Methodology and tools for the rapid prototyping in the heterogeneous systems co-design

- Program encapsulations for the databases
- Reasoning in the intelligent systems

Key publications

- *Toporkov,V.V.* Flow and greedy algorithms of the consistent resource co-allocation in the distributed systems (in Russian) // Izvestia RAN. Theory and control systems.2007. No 2. P. 109—119.
- *Rybakov, R.A.* Specification of the distributed control systems in real time scale in the limits of an automate approach (in Russian) // Information technologies. 2007. No 6. P. 37—41.
- *Zhiao Tsungsai, Sharapov, A.P.* Development and hardware implementation of the cavity filling algorithms for building the three-dimension image on the basis of the irregular sections (in Russian) // MPEI Vestnik. 2007. No 5. P. 102—108.
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- *Toporkov, V.V.* Reference plans of a resource consistent allocation at arrangement of the distributed computations on the scaled systems (in Russian) // Programmirovanie. 2008. No 3. P. 50—64.
- *Vadin, V.N.; Golovina, E.Yu.; Zagorianskaya, A.A,; Fomina, M.V.* Trustworthy and believable derivation in the intelligent systems (in Russian) / Under Edition of Vagin, V.N.; Pospelov, D.A. — 2nd edition. Moscow. Fizmatlit Publisher, 2008. 712 p.
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- *Ermolov, A.A,; Fomina, M.V.* Review and comparison of the methods of the Bayes network learning for a solution the problem of an object classification (in Russian) // Ibidem. V 2. P. 32—41.
- *Kulikov, A.V.; Fomina, M.V.* Generalization algorithms for processing of data with "noise"// ibidem. V. 2. P. 326—334.
- *Toporkov V.V.* Flow and greedy algorithms of resource co-allocation in distributed systems // Journal of Computer and Systems Sciences Int. Pleiades Publishing Inc. 2007. Vol. 46. No. 2. P. 269—278.
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Patents

- *Certificate* on a software 2007610688. Software complex for a steganography container choice / G.A. Borodin; S.V. Chirkova. 2007.

Dissertations

- *Zhiao Tsungsai,* Research and development of the methods for obtaining the three-dimension images under a supersonic research: Cand. Sci. (Techn.) Dissertation. 2008.
- *Zernov M.M.* Methods and software products for the decision making support on the basis of the fuzzy situation networks: Cand. Sci. (Techn.) Dissertation. 2008.

Partners

- Russian Academy of Sciences, Moscow
- Russian Foundation for Basic Research, Moscow
- TIMA Laboratory, Grenoble, France
- Lomonosov Moscow State University
- Moscow Physics Engineering University
- Joint Institute of Nuclear Researches, Dubna
- Open University Dubna
- European Center of Nuclear Researches CERN, Geneve
- INTEL Company
- TIMA /Laboratory, Grenoble, France
- R&DI QUANT
- Ilmenau Technical University, Germany
- Russian Ministry of Defence

Unique equipment

- PDM-system ProENGINEER
- Logic simulator Vantage Spreadsheet
- High-level synthesis tools Synopsys
- MAXPlus II, Foundation Series tools for FPGA design
- GSSS tools for structure synthesis
- Dynamical systems simulator MASS

IACE INFORMATION-MEASUREMENT TECHNIQUE (IMT) DEPARTMENT

Ph/fax.: (495) 362-7214,
E-mail: IIT-all@mpei.ru;
IIT@mpei.ru,
Internet site www.mpei.ac.ru/iit1

At IMT Department:
23 teachers,
7 researchers,
12 Ph.D. students.

Head of Department
Dr. Sci. (Techn.),
Professor Igor N. ZHELBAKOV

Main lines of research

Research Supervisor

- **Measuring facilities on the basis of the digital signal processing**
  Professor Zhelbakov I.N.
- **Investigation of the delta-sigma ADC**
  Professor Didenko V.I., associated-professor Solodov Yu.S.
- **Power transformer diagnostics**
  Professor Malinovskiy V.N.
- **Intellectual pressure sensors with the HART-protocol**
  Associated-Professors Evlanov Yu.N., Shatokhin A.A.
- **Level and consumption measurements by the ultrasonic methods**
  Associated-Professor Novikov V.A.
- **Measurement systems for monitoring and diagnostic of a high-voltage equipment**
  Senior Lecturer Bykov A.P.
- **Electrical variables measurement in the electric power systems**
  Associated-Professor Shatokhin A.A., Senior-Lecturer Makarychev P.K.

Agreements, contracts, projects supported by the state budget

- Cooperation and the joint research-academic activity agreement with the purposes of an expert training on the control systems between MPEI (TU) and Federal State Unitary Enterprise MARS
- Adjustment and calibration of the magnetic thickness-meters MT2007
- Development of the entry and telegram filtering mechanisms for an account system of the vacant car-tanks
- Development and implementation the measuring equipment for monitoring and diagnostics of the winding deformations of lthe arge power transformers being under the loading
- Development of an automated multi-channel measuring system for the time characteristic measurements of the resistive regulators under loading (RUL), an active winding resistance of the power high-voltage RUL transformers, the obtaining the volt-ampere characteristics of the current transformers for the power high-voltage transformers

Key publications

- *Krug, P,G.; Petrov, O.M.* Virtual simulators of the railway and car scales (in Russian). Moscow: Mashinostroenie-1 Publisher, 2007. 130 p.

- *Korovina, O.A.; Shatokhin, A.A.* Review of a generator-calibrator for calibration and attestation of the measuring facilities for the electrical energy quality indices (in Russian) // MPEI Vestnik. 2007. No 5. P. 86.
- *Serov, A.N.; Shatokhin, A.A.* Analysis of a truncation error at the digital measurement of a power and an energy (in Russian)// MPEI Vestnik. 2008. No 5. P. 107.
- *Didenko, V.I., Ivanov, A.V., Teplovodskiy, A.V.* New approach to a theory of the sigma-delta analog-to-digital converters // Proc. 15th IMECO TC4 Symp. and 12th Workshop on ADC Modeling and Testing. September 19—21, 2007, Iasi, Rumania.

Partners

- MIDAUS company (Microelectronic sensors and devices), Ul'yanovsk XENHUE KANGYU Control Systems Engineering INC, Ningbo, China Ilmenau Technical University, Germany
- Concern Rosenergoatom branch «Smolensk nuclear power plant», Desnogorsk, Smolensk region.
- «North-West HEPP», Sankt-Peterburg
- Branches «Severodvinskaya HEPP-1» and «Severodvinskaya HEPP-2» of «Arkhangelskaya generiruiuschaya compania»
- «BureyaGidroElektroMontazh», Blagoveschensk
- «Bratskiy aliuminievy zavod», Bratsk
- «Tumen'energo», «Bashkirenergo», «Vologdaenergo», «Irkutskenergo»

Unique equipment

- Automation system for an electric-physical experiment (SAEX/EF)
- Software testing packet for an analog-digital conversion in a dynamic mode
- Strain-gauge measuring complex for the composite materials diagnostics
- Secondary measuring transducer of LUSI-DI sensor
- Measuring system for the technical parameters control of the RUL transformers

IACE ELECTRICAL PHYSICS DEPARTMENT

Ph.: (495) 362-7379, (495)362-7505,
Fax: (495) 362-1222,
E-mail: supervisor@vvk2.mpei.ac.ru

At Electrical Physics Department:
20 teachers,
6 Ph.D. students,
1 researcher

Head of Department
Ph. D. (Tech.) Professor
Yuri A. KAZANTSEV

Main lines of research

Research Supervisor

- **Digital systems for the electric energy quality and quantity monitoring in the high-voltage power nets**
  Professor Gevorkian V.M., Associated-Professor Mikhalin S.N.
- **Calculation and designing of the compact passive and active devices of SHF range**
  Professor Gevorkian V.M., Associated-Professor Vishnyakov S.V.
- **Electromagnetic compatibility of the information systems in the electric and power engineering equipment**
  Professors Kazantsev Yu.A., Gevorkian V.M.
- **Algorithms and methods of the digital information processing**
  Associated-Professor Borodkin E.A.
- **Digital technologies of an information security**
  Associated-Professor Rytov A.A.
- **Digital multirate systems for the multidimensional signal processing.**
  Professor Tchobanou M.K.

Agreements, contracts, projects supported by the state budget

- Investigations of the multi-dimension signal coding and image recovering with a high resolution from the several coded images with a low resolution
- Development of the C-range filters
- Development of the C-range coaxial-wave-guide transfer
- Investigation and development of the electromagnetic field numerical calculation methods in the complicated electrodynamic systems
- Development of the new effective multi-dimensional multi-speed systems

Key publications

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- *Gevorkian, V.M.; Troshin, P.V.* Comparison of the estimation methods of the real electric net subject's contribution to the parameters of the electric net quality distortion (in Russian) // Industrial energetic, No 7, 2008, p. 46—50.
- *Bunin, A.V.; Vishnyakov, S.V.; Gevorkian, V.M.; Kazantsev, Yu.A.; Mikhalin, S.N.; Polukarov, V.I.* Diplexer on the dielectric resonators for Ku-range (in Russian) // Proc. of 18-th Intern. Crimean conf.«SHF equipment and telecommunication systems» «CriMiKo 2008», Sevastopol, Crimea, Ukraine, September 8-12, 2008 , Transaction Vol. 2, p. 478—479.
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- *Tchobanou, M.K.* Synthesis of the basic elements of the multidimensional multirate systems. Part I. Nonseparable decimation matrices (in Russian) // Ibidem No 1. p. 95—113.
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- *Gevorkian, V.M.* Electromagnetic compatibility of the electronic information systems. Part 2. Electromagnetic compatibility of the digital data processing and transmission systems (in Russian). Textbook. Moscow. MPEI Publishers, 2007, 308 p.
- *Tchobanou, M.K.* Digital multirate systems of the signal processing. Textbook for courses «Digital signal processing» and «Digital multirate systems» (in Russian). Moscow MPEI Publishers, 2008, 107 p.

Patents

- *Patent № 2316089 RF* Antenna element / Bunin A.V., Vishnyakov S.V., Gevorkian V.M., Kazantsev Yu.A., Mikhalin S.N., Polukarov BI. 2008.
- *Patent № 2295806 RF* Pass-band filter / Bunin A.V., Vishnyakov S.V., Gevorkian V.M., Kazantsev Yu.A., Mikhalin S.N., Polukarov BI. 2007.
- *Patent № 2295805 RF* Pass-band filter / Bunin A.V., Vishnyakov S.V.,Gevorkian V.M., Kazantsev Yu.A., Mikhalin S.N., Polukarov V.I. 2007.
- *Patent № 2295807 RF* Diplexer / Bunin A.V., Vishnyakov S.V., Gevorkian V.M., Kazantsev Yu.A., Mikhalin S.N., Polukarov V.I. 2007.
- *Patent № 2305350 RF* Pass-band filter / Bunin A.V., Vishnyakov S.V., Gevorkian V.M., Kazantsev Yu.A., Mikhalin S.N., Polukarov V.I. 2007.

- *Patent № 2301481 RF* Pass-band filter / Bunin A.V., Vishnyakov S.V., Gevorkian V.M., Kazantsev Yu.A., Mikhalin S.N., Polukarov V.I. 2007.
- *Patent № 67341 RF* Diplexer on the dielectric resonators/ Bunin A.V., Vishnyakov S.V.,Gevorkian V.M., Kazantsev Yu.A., Mikhalin S.N., Polukarov V.I. 2007.
- *Patent № 73492 RF* Autonomous automatic complex measuring device for the quality and quantity controlling of an electrical energy in real-time mode in the high-voltage nets / Bunin A.V., Vishnyakov S.V., Gevorkian V.M., Kazantsev Yu.A., Mikhalin S.N., Polukarov V.I. 2008.
- *Patent Application №2008124733 RF* Pass-band filter on the dielectric resonators / Bunin A.V., Vishnyakov S.V., Gevorkian V.M., Kazantsev Yu.A., Mikhalin S.N., Polukarov V.I. 2008

Dissertations

- *Tchobanou M.K.* Analytical synthesis of the multi-dimensional non-separable signals and devices for the multi-rate systems of the image processing : Dr. Sci. (Tech.) Dissertation. 2007.
- *Plakhov A.G.* Methods, algorithms and devices for the frame-by-frame coding and the video data transmission by the radio channels with a low bandwidth: Cand. of Sci. (Techn) Dissertation. 2008

Partners

- State research center «All-Russia Electrical Engineering Institute named after V.I. Lenin», Moscow, Russia
- State Unitary Enterprise «R&D Institute of Automatic», Moscow, Russia
- Special Design Bureau of MPEI, Moscow, Russia
- «Huawei Technology Co., Ltd», China
- Norway University of Science and Technology, Trondheim, Norway
- State Unitary Enterprise «R&D center of precision devices», Moscow, Russia
- State Unitary Enterprise «Girikond», Saint-Petersburg, Russia
- State Unitary Enterprise «KB Luch», Rybinsk, Russia
- «Ceramics» Company, Saint-Petersburg, Russia
- Technological University of Tokio, Japan
- Technological University of Tampere, Finland
- California University of Santa-Barbara, USA
- «Electrozavod» Public Corp., Moscow, Russia

IACE APPLIED MATHEMATICS (AM) DEPARTMENT

Tel.: (495) 362-7962
Fax: (495) 362-7775
Email: kafedra@appmat.ru

On AM Department: 52 lecturers,
8 researchers
9 engineers,
20 Ph.D.- students.

Head of the Department
Dr. Sci. (Techn.), Professor,
Winner of the Educational Award
of the Russian President
Alexander P. EREMEEV

Main lines of research

Research Supervisor

- **Fundamental Problems of the Artificial Intelligence.**
  Professors Vagin V.N., Eremeev A.P., Plesnevich G.S.
- **Methods, Languages and Systems of the Parallel Programming and Managing of the Parallel Processes.**
  Professors Kutepov V.P., Falk V.N., Associated-Professor Shamaeva O.Yu.
- **Mathematical Support and Software of the Intelligent Systems: Control Systems, Decision Support Systems, Expert Systems, Tutoring Systems.**
  Professors Vagin V.N., Eremeev A.P., Associated- Professor Bashlykov A.A.
- **Non-Classical Logic: Probability Logics, Fuzzy Sets, Neural Networks, Multi-Agent Systems.**
  Professors Plesnevich G.S., Associated-Professors Averkin A.N., Varshavsky P.R., Tarasov V.B.
- **Software of the Information Systems and Networks, INTERNET/INTRANET Technologies.**
  Associated-Professor Chernov P.L.
- **Technologies of the Software Development and Verification, Information Security.**
  Professor Khorev P.B., Associated-Professor Maran M.M.
- **Developing, Studying and Using of the Graph Models.**
  Associated-Professor Neznanov A.A.
- **Control tools for the large systems.**
  Associatев-Professor Akchurin R.M.
- **Development of the Computer Tutoring Systems.**
  Professor Glagolev V.B., Associated-Professors Maran M.M., Batasova V.S., Men'shikova K.G., Shamaeva O.Yu.

Contracts and state budget projects

- Models and Methods of a Decision Search on the Basis of an Expert Knowledge in the Intelligent Decision Support Systems.
- Research and Development of the Methods and Tools for the Concept Inductive Forming in the Intelligent Decision Support Systems.
- Development of the Models, Methods, Languages and Software for the Cluster Systems.
- Development of the Theory and Network Technologies for Tutoring and Decision Making.
- Development of the Structural Informatics Theory.
- Enhancement of the Hardware-Software System Quality and Reliability.

Key publications

- *Vagin, V.N.; Golovina, E.Yu;, Zagoryanskaya, A.A.; Fomina, M.V.* Exact and Plausible Inference in the Intelligent Systems (in Russian). Second Edition, revised and enlarged / Edited by V.N. Vagin, D.A. Pospelov // Moscow: Fizmatlit Publisher, 2008. — 712 p.
- *Eremeev, A.P.* Game-Theoretical Methods of Decision Making: Tutorial (in Russian). MPEI Publishing House, 2007. — 52 p.
- *Neznanov, A.A.; Kohov, V.A.* Algorithmization of the Solving Enumerating Problems of a Graph Analysis (in Russian). — MPEI Publishing House, 2007. — 80 p.
- *Vagin, V.N.; Yeremeyev, A.P.* Modeling Human Reasoning in the Intelligent Decision Support Systems // Proc. of the Ninth Intern. Conf. on Enterprise Information Systems. Volume AIDSS. Funchal, Madeira, Portugal, June 12—16, 2007. INSTICC, pp. 277—282.
- *Nedelina A., Eremeev A., Fengler W.* Development of Distributed Planner for Decision Support Systems // Proc. of the International Conference on Dependability of Computer Systems. Szklarska Poreba, Poland, 14-16 June, 2007, IEEE Computer Society, pp. 324—330.
- *Eremeev, A., Varshavsky, P.* Application of Case-based reasoning for Intelligent Decision Support Systems // Proceedings of the XIIIth International Conference «Knowledge-Dialogue-Solution» — Varna, vol. 1, 2007, pp. 163—169.
- *Eremeev, A., Varshavsky, P.* Methods and Tools for Reasoning by Analogy in Intelligent Decision Support Systems // Proc. of the International Conference on Dependability of Computer Systems. Szklarska Poreba, Poland, 14—16 June, 2007. IEEE, pp. 161—168.
- *Eremeev, A.P.; Kurilenko, I.E.* Realization of the Temporal Reasoning Mechanism in the Contemporary Intelligent Systems (in Russian) // Proceedings of the RAS. Control Theory and Systems, 2007, No 2, pp. 120—136.
- *Eremeev, A.P.; Kurilenko, I.E.* Using of Temporal Reasoning in the Real Time Intelligent Systems (in Russian) // Intelligent Systems. Collective monograph. Second issue / Edited by V.M. Kureychik. — Moscow: Fizmatlit Publisher, 2007, pp. 114—130.
- *Kutepov, V.P.* Intelligent Control of the Processes and Workload in Computing Systems (in Russian) // Proceedings of the RAS. Control Theory and Systems, No 5, 2007, pp. 58—73.
- *Bazhanov, S.E.; Kutepov, V.P.; Vorontsov M.M.* Functional Parallel Programming Environment for the Multicore Computers and Clusters // Proceedings of International Symposium on Distributed Computing and Applications to Business, Engineering, and Science DCABES, v. 1, 2007, pp. 337—341.
- *Kutepov, V.P.* Scheduling Parallel Processes and Load Balancing in Large Scale Computing Systems // Ibidem. P. 444—448.
- *Eremeev, A., Varshavsky, P.* Case-based reasoning method for the real-time expert diagnostics systems // International Journal «Information Theories & Applications», Volume 15, Number 2, 2008. pp. 119—125.
- *Eremeev, A.P.; Kurilenko, I.E.* Modelling of Temporal Reasoning in the Real Time Intelligent Systems (in Russian) // MPEI Vestnik, No 1, 2008, pp. 114—123.
- *Eremeev, A.P.; Podogov, I.Yu.* General Method of the Hierarchical Reinforced Learning for the Intelligent Decision Support Systems (in Russian) // Programming Products and Systems, No 2, 2008, pp. 35—39.
- *Vagin, V.N.; Eremeev, A.P.* Research and Development of the Applied Mathematics Department on Designing the Intelligent Decision Support Systems on the Basis of the Non-Classical Logics (in Russian) // MPEI Vestnik, No 5, 2008, pp. 16—26.

- *Vagin, V.N.; Michaylov, I.S.* Developing of the Information System Integration Method on the Basis of the Domain Meta-Modelling and Ontology (in Russian) // Programming Products and Systems, No 1, 2008, pp. 22—26.
- *Vagin, V.N.; Fomina, M.V.; Kulikov, A.V.* The Problem of Object Recognition in the Presence of Noise in Original Data // 10th Scandinavian Conference on Artificial Intelligence SCAI 2008. A. Holst, P. Kruger, and P. Funk (eds.), IOS Press, Amsterdam, 2008, pp. 60—67.
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- *Vagin, V.N.; Novoselov, Yu.V.* Cognitive Graphics in the Decision Support System for the Nuclear Reactor Diagnostics (in Russian) // Proceedings of the XXXV Anniversary International Conference «Information Technologies in Science, Education, Telecommunication and Business» IT+S&E'08, Ukraine, Crimea, May 20-30, 2008, pp. 120—122.
- *Vagin, V.N.; Khotimchuk, K.Yu.* Finding of the Minimal Abductive Explanations with Primary Implicants (in Russian) // Proceedings of the 11th National Conference on the Artificial Intelligence with International Participation, v. 2, M.: LENAND, 2008, pp. 345—355.
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- *Kohov, V.A.; Neznanov, A.A.; Tkachenko, S.V.* Development of the Automatic System for Scientific Researches «Graph Model Workshop» for Researches in the Structural Analysis Area (in Russian) // Proceedings of the International Conference «Informational Tools and Technologies», v. 2, MPEI Publishing House, 2008, pp. 45—49.
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Dissertations

- *Lu Lan.* Research of the Efficiency of Parallel Computations on the MPEI Cluster. Cand of Sci. (Techn.) Dissertation , 2007.
- *Kurilenko I.E.* Research and Development of Methods and Software Tools of the Temporal Inference in the Intelligent Decision Support System. Cand of Sci. (Techn.) Dissertation, 2008.
- *Mikhaylov I.S.* Mathematical Support and Software of the Structural and Semantic Interoperability of the Informational Systems on the Basis of the Meta-Models. Cand of Sci. (Techn.) Dissertation, 2008. 9r

Partners

- Computer Center of RAS, Moscow.

- Institute of Programming Systems of RAS, Pereyaslavl-Zalessky.
- Institute of Control Problems of RAS, Moscow.
- Institute of System Analysis of RAS, Moscow.
- Russian R&D Institute of Information Technologies and Computer-Aided Design Systems, Moscow.
- Institute of Cybernetics of Ukrainian Academy of Sciences, Kiev, Ukraine.
- Moscow Research Institute of Ophthalmology under Federal Agency on the High-Technology Medical Aid, Moscow.

IACE COMPUTERS, SYSTEMS AND NETWORKS (CSN) DEPARTMENT

Ph./fax: (495) 362-7558,
Ph.: (495) 362-7283,
E-mail: vmss@mpei.ru, vmss-all@mpei.ac.ru;
Internet site: srv-vmss.mpei.ac.ru

At CSN Department:
31 teachers,
22 Ph.D. students.

Head of department Ph.D. (Techn.),
Professor Alexander F. KRIUKOV

■ Main lines of research

Research Supervisor

- **Network computer technologies. Development of the models, the performance estimation and the parameter measurement for the computer network units, its representation**
  Professor Abrosimov L.I.
- **Computer and network systems for a knowledge evolution**
  Associated-Professor Afonin V.A.
- **Application of the modern applied software packets for modeling and design of the computer engineering facilities**
  Professor Balashov V.N.
- **Algorithms and compression methods for the halftone images. Discrete processes modeling by means of the GPSS language**
  Associated-Professor Gol'tsov A.G.
- **Design and creation of the fault-tolerant computer networks**
  Associated-Professor Danilin G.G.
- **Modeling of the multi-processor computer systems. Design of the microprocessor systems for an object control**
  Associated-Professor Deriugin A.A.
- **Search of the new architecture principles for the computer systems implementation. Data integration and a knowledge extraction. Development of the educational technologies**
  Professor Dzegelionok I.I.
- **Database design**
  Associated-Professor Dolotov V.G.
- **Speech technologies and a teaching process automation**
  Associated-Professor Evseev A.I.
- **System design on the basis of the modern micro-controllers**
  Associated-Professor Ivanov A.V.
- **Design of the microprocessor control systems**
  Associated-Professor Kaporsky A.V.
- **Development of Intranet of the department**
  Professor Kriukov A.F.
- **Information security. Modern cryptography. Electronic digital signature. Electronic money. Steganography and stegano-analysis**
  Professor Melnikov Yu.N.
- **Investigation of the modern principles for the parallel data processing. Development of the fault-tolerant computing systems**
  Professor Ladygin I.I.
- **Computation models and a computing system architecture**
  Associated-Professor Morokhovets Yu.E.

- **Design and the modeling automation for the digital systems on the basis of the equipment description languages VHDL and VERILOG**

  Associated-Professor Poliakov A.K.

- **Synergetic of CSN**

  Associated-Professor Fadeev N.N.

Agreements, contracts, projects supported by the state budget

- Development and investigation of the asynchronous conveyer data processing models
- Development and investigation of the multilevel systems of the hierarchical data processing models

Key publications

- *Abrosimov, L.I.; Kalashnikov, S.G.; Repin, D.S.* Technique of the experimental analysis of the corporate computer network operation efficiency (in Russian) // MPEI Vestnik. — 2008. No. 3. — P. 73—82.
- *Abrosimov, L.I.; Krepkov, I.M.; Kogut, L.D.* Training of the IT-experts with new knowledge and skills in the education-innovation centre (in Russian) // Proc. of XVI Intern. Conf. «Informational systems and technologies». Moscow: MPEI Publishing House. — 2008. Vol. 2. — P. 106—111.
- *Gotovski, M.Y.; Perov, Yu.F.; Chernetsova, L.V.* Bioresonance therapy (in Russian). Moscow: IMEDIS Publisher. — 2008. — 176 p.
- *Danilin, G.G.; Zarvigorov, D.A.* Estimation of the campus computer network structures quality (in Russian) // MPEI Vestnik. — 2008. No. 2. — P. 90—94.
- *Deriugin, A.A.* Switchboards of the computer systems. The manual for students (in Russian). Moscow: MPEI Publishing House. — 2008. — 112 p.
- *Dzegelionok, I.I.; Orlov, D.A.; Kharitonov, V.Y.* Computing aspects of the virtual reality distributed systems construction (in Russian) // MPEI Vestnik. — 2008. No. 5. — P. 27—32.
- *Dzegelionok, I.I.; Kharitonov, V.Y.; Orlov, D.A.* The approach to organization of the distributed computations for the coordinated moving objects visualization under control of theremote users (in Russian) // Proc. of IV Intern. Conf. «Parallel Computations and Control Problems» PACO'. M.: CPI named after V.A. Trapeznikov of RAS Publisher. — 2008. — P. 867—883.
- *Il'in, P.E.* The multitask territorially distributed computing environment taking into account an efficiency of the data transfer (in Russian) // MPEI Vestnik. — 2008. No. 2. — P. 95—99.
- *Kalinina, G.A.; Morokhovets, Yu.E.* Model of the asynchronous automatic data processing (in Russian) // MPEI Vestnik. — 2008. No. 5. — P. 57—61.
- *Kalinina, G.A.; Morokhovets, Yu.E.* On reliability of the asynchronous automatic schemes with the regular components (in Russian) // Proc. of XVII Intern. Seminar «Modern technologies in problems of control, automation and information processing». Alushta, 2008. Sankt-Petersburg: GUAP Publisher. — 2008. — P. 50—52.
- *Ladygin, I.I.; Loginov, A.V.; Filatov, A.V.; Yankov, S.G.* Clusters on the multicore processors. The manual for students (in Russian). / Under edition of I.I. Ladygin. Moscow: MPEI Publishing House. — 2008. — 112 p.
- *Mel'nikov, Yu.N.; Terenin, A.A.* Hidden possibilities of protection against the informational safety infringers (in Russian) // Banking technologies. — 2007. No. 1. — P. 32—37.
- *Mel'nikov, Yu.N.; Terenin, A.A.* Additional methods of the digital watermark protection (in Russian) // Information protection. Inside. — 2007. No. 3. — P. 83—88.

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- *Morokhovets, Yu.E.* Hierarchical data processing systems and their time characteristic analysis task (in Russian) // Proc. of XV Intern. Conf. «Informational systems and technologies». Moscow: MPEI Publishing House. — 2007. Vol. 2. — P. 195—199.
- *Otsokov, Sh.A.* Possible applications of the Genzel code arithmetic (in Russian) // MPEI Vestnik. — 2007. No. 5. — P. 97—101.
- *Otsokov, Sh.A.* Result integer criterion of the arithmetic floating-point operations (in Russian) // Information technologies. — 2007. No. 7. — P. 50—52.
- *Poliakov, A.K.; Tileb, M., Tileb, N.* Library of the VERILOG-descriptions of the arithmetic operations in the Galua field (in Russian) // Modern electronics. — 2007. No. 5. — P. 45—48.
- *Poliakov, A.K.; Siniukhina, L.A.; Tileb, M., Tileb, N.* Introduction to PLC CAD of XILINX Corporation. Laboratory practical manual (in Russian). Moscow: MPEI Publishing House. — 2007. — 48 p.
- *Yankov, S.G.* Analysis of the execution effectiveness of the parallel programs on the multi-processor (multi-core) cluster computer systems (in Russian) // MPEI Vestnik. — 2008. No. 5. — P. 113—119.
- *Ladygin, I.I.; Yankov, S.G.* Technique for Analyzing Items Reliability by Simulating Their Behaviour over Time Intervals / Proc. of International Conference on Dependability of Computer Systems DepCoS-RELCOMEX. Szklarska Poreba, Poland, 2007. IEEE Computer Society, Los Alamitos, CA, USA, 2007. P 115—119
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Dissertations

- *Zarvigorov, D.A.* Development of a corporate information network structure choice technique. Cand. Sci. (Techn.) Dissertation. 2008.
- *Il'in, P.E.* Organization of the territorially-distributed computations with use of the decomposition models. Cand. Sci. (Techn.) Dissertation. 2008.
- *Matip* Essunga Lazar Development and investigation of the corporate computing system productivity management, built in a network platform of administration. Cand. Sci. (Techn.) Dissertation. 2008.

Partners

- State Unitary Enterprise «All-Russia Electrical Engineering Institute named after Lenin», Moscow
- Research-Industrial Association «Volna», Moscow
- Institute of Microprocessor Systems, RAS, Moscow
- Research-Industrial Company «Agrostroi», Moscow
- Ilmenau Technical University, Germany.

IACE MATHEMATICAL MODELING (MM) DEPARTMENT

Ph.:(495) 362-7774,
E-mail: mathmod@apmsun.mpei.ac.ru;
info@mathmod.ru

At MM Department:
40 teachers,
10 Ph.D. students.

Head of Department
Dr. Sci. (Phys.-Math.),
Professor Andrey A. AMOSOV

Main lines of research

Research Supervisor

- **Methods for solving of the some classes of problems in a modern theory of the partial differential equations and an investigation of their properties**
  Professors Amosov A.A., Dubinskiy Yu.A., Zlotnik A.A.
- **Numerical methods for solving of the mathematical physics problems**
  Professors Amosov A.A., Zhileikin Ya.M., Zlotnik A.A.
- **Mathematical modeling of the discrete systems: implementation of the large finite algebraic systems in a computer algebra, coding, cryptography, pattern recognition and diagnostics**
  Professor Frolov A.B., Associated-Professor Meshchaninov D.G.
- **Mathematical and informational provision of an economic activity**
  Associated-Professors Akhmetshin A.A., Zaslavskiy A.A.
- **Statistical methods of the digital information processing, the methods of their optimization**
  Professors Goritskiy Yu.A., Ishmukhametov A.Z.
- **Intellectual recognition systems, data bases**
  Associated-Professors Zubov V.S., Kniazev A.V.

Agreements, contracts, projects supported by the state budget

- Non-classical problems of the mathematical physics
- Multi-dimensional complex boundary value problems (the models development and their investigation)
- Scheme and software methods for computing in the finite algebraic structures as applied to an information protection and a pattern recognition
- Evaluation of the dielectric obsolescence processes based on a solving of the inverse problems for the mathematical models

Key publications

- *Ahues, M.; Largillier, A.; Amosov, A.* Superconvergence of Projection Methods for Weakly Singular Integral Operators // Integral Methods in Science and Engineering: Techniques and Applications, C. Constanda and S. Potapenko (eds.), Birkhauser, Boston, 2007. P. 1—8.
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- *Amosov, A.A.; Ignatieva, N.U.; Pereskokov, A.V.* Problems in calculus of variations (in Russian): MPEI Publishing House, 2008.
- *Amosov A., Panasenko G.* An approximate solution to the integral radiative transfer equation in an optically thick slab // Mathematical Methods in the Applied Sciences. 2007. Vol. 30. P. 1593—1608.
- *Antipin, I.P.; Ishmukhametov, A.Z.; Karyukina, Yu.G.* On some optimization methods with finite-step interior schemes in the convex finite-dimensional problems with restriction of an inequality type (in Russian) // Comp. Math. and Math. Phys. 2007. Vol. 47. № 12. P. 2014—2022.
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- *Cherepova, M.F.* The Cauchy problem for a higher order parabolic equation with the growing coefficients (in Russian) // Ibidem. P. 262—266.
- *Chernysheva, N.V.* Program facilities for testing and generation of polynomials with the given properties over the finite fields (in Russian) // Ibidem. P. 267—275.
- *Frolov, A.B.* Clustering and pattern recognition representing the objects or their aggregates as functions (in Russian) // Ibidem. P. 246-253.
- *Frolov A.B., Shchurov I.I.* Key pre-distribution in a local computer network (in Russian) // Ibidem. P. 254—261.
- *Goshev, I.A.* Smoothness of the solutions of the problem describing the longitudinal oscillations of a visco-elastoplastic Ishlinskii material and of the corresponding homogenized problem. Homogenization error estimate (in Russian) // Ibidem. P. 185-190.
- *Krupin, G.V.* Decomposition of complex periodic Lebesgue space into an irrotational subspace and its orthogonal complement (in Russian) // Ibidem. P. 207—213.
- *Kuz'mina, O.L.* The algebraic method for constructing the optimal polynomial of the partial function over some commutative rings (in Russian) // Ibidem. P. 214—219.
- *Mamontov, A.I.; Meshchaninov, D.G.* Functional systems of polynomials with the integer and rational coefficients (in Russian) // Ibidem. P. 220—226.
- *Tigetov, D.G.; Goritskiy, Yu.A.* The probability model of the mechanical interaction of the rough surfaces (in Russian) // Ibidem. P. 235—245.
- *Zubov, V.S.; Kraskov, V.V.* Benchmark analysis of the different representations of the priority queues (in Russian) // Ibidem. P. 191—199
- *Bolotov, A.A.; Gashkov, S.B.; Frolov, A.B.* Elliptic curve cryptographic protocols (in Russian): MPEI Publishing House, 2007. 80 p.
- *Bolotov A.A., Gashkov S.B., Frolov A.B.* Pairing based cryptographic protocols (in Russian): MPEI Publiscing house, 2007. 64 p.

- *Borovikov, I.A.* Hahn-Banach theorem in modules over the Clifford algebras (in Russian) // MPEI Vestnik. 2007. № 6. P. 5—10.
- *Borovikov, I.A.* Certain decompositions of the Sobolev-Clifford modules and the nonlinear variational problems (in Russian) // Proceedings of Steklov mathematical institute. 2008. Vol. 260. P. 57—74.
- *Bulycheva, O.N., Grigor'ev, V.P.* A higher mathematics. A typical problem book (in Russian): MPEI Publishing House, 2008. 24 p.
- *Cherepova, M.F.* On solvability of the boundary value problems for a parabolic equation with growing near the boundary coefficients (in Russian) // Differential Equations. 2007. Vol. 43. № 1. P. 110—121.
- *Chudinova, N.N.; Beresnev, E.N.; Grigor'ev, V.P.* Stability constants of the ytterbium cyclo-hexaphosphate complexes (in Russian) // Journal of inorganic chemistry. 2007. Vol. 52. No 4. P. 691—695.
- *Dubinskiy, Yu.A.* On the smoothing property of the solenoidal factorization (in Russian) // MPEI Vestnik. 2007. No 6. P. 20—22.
- *Ducomet B., Zlotnik A.* On stability of the Crank-Nicolson scheme with the approximate transparent boundary conditions for the Schredinger equation, Part II // Comm. Math. Sci. 2007. Vol. 5. No 2. P. 267—298.
- *Frolov, A.B.; Shchurov, I.I.* Key pre-distribution in the local computer networks (in Russian) // Proc. of Scientific seminar devoted to memory of Dr. Sci. Benenson Z.M.: Computing Center of RAS, 2008. P. 20—25.
- *Goritskiy, Yu.A.* On the measuring information quality while group objects location (in Russian) // Ibidem. P. 12—19.
- *Frolov, A.B.; Shchurov, I.I.* Non-Centralized Key Pre-Distribution in the Computer Networks // Proc. Of Intern. Conf. on Dependability of Computer Systems. June 26-28, 2008. Szklarska Poreba, Poland. P. 179—188.
- *Frolov, A.B.; Shchurov, I.I.* Protected communications at non-centralized key pre-distribution (in Russian) // MPEI Vestnik. 2008. No 4. P. 102—110.
- *Frolov, A.B.; Bredikhin, R.N.* Finite topological principle and classification of the topological forms (in Russian) // MPEI Vestnik. 2008. No 5. P. 47—56.
- *Software* product «Algebraic Processor» (in Russian) // Informatization of the engineering education. Electronic Resources of MPEI for education / Frolov A.B., (under edition of Maslov S.I.): MPEI Publishing House, 2008. P. 271—274.
- *Gorelov, V.A.* Algebraic independence criterion for the ensemble of the Kummer functions meaning and their derivatives (in Russian) // MPEI Vestnik. 2007. No 6. P. 30—42.
- *Goshev, I.A.* Additional smoothness of the solutions of the two-scale homogenized problem describing the Ishlinskii type visco-elastoplastic body longitudinal vibrations (in Russian) // MPEI Vestnik. 2008. No 6. P. 46—58.
- *Ishmukhametov, A.Z.; Makhrous, R.* The dual regularization method in control problem of the lamina oscillations (in Russian) // Avtomatika and telemekhanika. 2007. No 2. P 162—169.
- *Ishmukhametov, A.,Z.; Sharifov, A.Ya.* On an optimal control problem for the Goursat-Darboux systems with non-local conditions (in Russian) // Proceedings of Computing Center of RAS «Theoretical and applied problems in nonlinear analysis». 2007. P. 139—147.
- *Kirsanov, M.N.* Graphs in Maple (in Russian): Fizmatlit Publisher, 2007. 168 p.
- *Kirsanov, M.N.* Theoretical mechanics. A solution book (in Russian): Fizmatlit Publisher, 2008.

- *Kniazev, A.V.* Fundamentals of programming in C++ (in Russian): MPEI Publishing House, 2008. 80 p.
- *Korikov, K.A.; Pereskokov, A.V.* Comparison of the asymptotic and exact eigenvalues for a one-dimensional polaron (in Russian) // MPEI Vestnik. 2008. No 6. P. 92-102.
- *Korikov, K.A.; Pereskokov, A.V.* Numerical research of a nonlinear problem on the eigenvalues for an one-dimensional polaron (in Russian)// MPEI Vestnik. 2007. No 6. P. 65—73.
- *Krupin, G.V.* Direct evidence of an orthogonal decomposition of the complex Lebesgues spaces which are periodical on all function directions (in Russian) // MPEI Vestnik. 2007. No 6. P. 23—29.
- *Makarov, P.V.* Three-dimensional equidistant regular star polyhedrons in the Lobachevskian space (in Russian) // Proc. of IX Intern. seminar «Discrete mathematics and its applications»: Lomonosov MSU Publisher. 2007. P. 393—395.
- *Nabebin, A.A.* Modular arithmetic and cryptography (in Russian): MPEI Publishing House, 2007. 201 p.
- *Vorob'eva, I.A.; Goritskiy, Yu.A.* On random time accounting of the terminal network production service (in Russian) // MPEI Vestnik. 2007. No 6. P. 57—64.
- *Zaslavskiy, A.A.* Geometry of the paired comparison (in Russian) // Avtomatika and telemekhanika. 2007. No 3. P. 181—186.
- *Zhebet, S.Yu.; Frolov, A.B.* Automatic generation of the algorithm for polynomial multiplication over the finite field (in Russian) // MPEI Vestnik. 2008. No 6. P. 59—70.
- *Zlotnik A.* On global in time properties of the symmetric compressible barotropic Navier-Stokes-Poisson flows in a vacuum. Instability in Models Connected with Fluid Flows II C. Bardos, A. Fursikov, eds. // Intern. Math. Series. Vol. 7. Berlin: Springer. 2008. P. 329—376.
- *Zlotnik, A.A.; Chetverushkin, B.N.* On parabolicity of the quasi-gasdynamic system of equations, its hyperbolic second-order modification and the stability of the small perturbations for them (in Russian) // Comp. Math. and Math. Phys. 2008. Vol. 48. No 3. P. 445—472.
- *Zlotnik, A.A.; Chetverushkin, B.N.* Parabolicity of the quasi-gasdynamic system of equations, a hyperbolicity of its one modification and the stability of the small perturbations for them (in Russian) // Doklady Mathematics. 2008. Vol. 418. No 5. P. 605—610.
- *Zlotnik, A.A.; Zlotnik, I.A.* On stability of a family of the finite-difference schemes with the approximate transparent boundary conditions for the Schroedinger equation on the half-axis (in Russian) // MPEI Vestnik. 2008. Vo 6. P. 31—45.
- *Zlotnik, A.A.* On parabolicity of a quasi-hydrodynamic system of equations and stability of its small perturbations (in Russian) // Mathematicheskiy sbornik. 2005. Vol. 83. No 5. P. 610—623.
- *Zlotnik, A.A.* On the stability of the sigma-scheme with the transparent boundary conditions for parabolic equations (in Russian) // Comp. Math. and Math. Phys. 2007. Vol. 47. |No 4. P. 671—692.
- *Zlotnik, A.A.; Ducomet B.* Stability of a symmetric finite-difference scheme with the approximate transparent boundary conditions for the time-dependent Schroedinger equation (in Russian) // Doklady Mathematics. 2007. Vol. 413. No 4. P. 444—449.
- *Zubov, V.S.; Batasova, V.S.* A problem book in basic computer preparation (in Russian): MPEI Publishing House, 2007. 123 p.
- *Zubov, V.S.; Shevchenko, I.V.* New algorithm of k-way merge sort (in Russian) // MPEI Vestnik. 2007. No 6. P. 49—56.

- *Zubov, V.S.; Shevchenko, I.V.; Kraskov, V.V.* Benchmark analysis of a heapsort algorithm (in Russian) // Electronic journal «Computing networks». 2007.

Dissertations

- *Mamontov A.I.* Functional systems of polynomials and their application in programming for the computer systems and networks: Cand. Sci. (Tech.) Dissertation. 2007.
- *Shevchenko O.V.* Development and research of analysis tools for one class of the satellite-based observation systems. Cand. Sci. (Tech.) Dissertation. 2007.
- *Shchurov I.I.* Methods and program facilities of the key pre-distribution in computer networks. Cand. Sci. (Tech.) Dissertation. 2007.

Partners

- Lomonosov Moscow State University, Moscow
- Computing Center of RAS, Moscow
- Institute of Hydrodynamics of RAS Siberian branch, Novosibirsk
- Institute of Computational Mathematics of RAS, Moscow
- Institute of Mathematical Modeling of RAS, Moscow
- Kazan State University
- Freiberg Mining Academy, Germany
- Steklov Mathematical Institute of RAS, Moscow
- Sobolev Mathematical Institute of RAS Siberian branch, Novosibirsk
- Mathematical Institute of Berlin Free University, Germany
- Novosibirsk State University, Novosibirsk
- Normal Polytechnic School, Lyonne, France
- South Federal University, Rostov-on-Don
- Institute of Mathematics, Chech Academy of Sciences, Prague
- Mexico Polytechnic Institute, Mexico, Mexico
- Milan Polytechnic Institute, Italy
- National Engineering School, Saint-Etienne, France
- Technical University, Ilmenau, Germany
- Jean Monnet University, Saint-Etienne, France
- Collegium Budapest. Advanced Study Institute, Budapest, Hungary

IACE ELECTRICAL ENGINEERING AND INTROSCOPY (EEI) DEPARTMENT

Tel.: (495) 362-7747, (495) 673-0350
e-mail: ETI-all@mpei.ru; ETI@mpei.ru

On EEI Department:
20 teachers,
3 researchers,
8 PhD student.

Head of Department
Ph. D. (Techn.),
Professor Valery P. LUNIN

Main research lines

Scientific LEADERs

- **Mathematical modeling of the electromagnetic testing procedures, the analysis algorithms of a diagnostic signal, the defect characterization and parametrization**

  Professor V.P. Lunin
- **Methods for undertaking and analysis of the magnetic nondestructive testing and the technical diagnostics data**

  Professor A.D. Pokrovsky
- **Methods for an eddy current defectometry and the quality testing**

  Associated-Professor L.A. Chernov
- **Algorithms for creating an interactive educational system in the electrical engineering**

  Professor E.V. Kuznetsov

Agreements, contracts, projects supported by the state budget

- Algorithms and software development for finding, characterization and estimation of the defect parameters of the heat exchanger tubes in the Nuclear Power Plants using an eddy current signal
- Experimental check action on increasing a validity of the heat exchanger tubes supervision for the Nuclear Power Plants WWER-1000 and WWER-440
- Study of regularities for generation and growing the defects in the heat exchanger tubes, an improvement nondestructive testing techniques of the heat exchanger tubes in the Nuclear Power Plants with WWER. Experienced-industrial test software-methodical provision for the eddy current systems, allowing evaluation of a deposit on the heat exchanger tubes
- Development of the theoretical basis in designing facilities of the eddy current, magnetic and electrical equipment
- Design of the matrix converters for the eddy current and the magnetic nondestructive testing
- Device development for the crack evolution monitoring in the corrosion environment conditions. Automatic data processing is expected
- Development of an advanced equipment for observation of the zircon product quality by the contact material
- Development of algorithms for preparation and analysis of a diagnostic information from the inner magnetic defectoscopes for observation of the oil and gas pipelines
- Development of the analysis methods for the diagnostic scenes and the artificial perceptions on the basis of a neuron technology
- Creation of the fundamental theory and algorithms for the distance interactive multistage system compilation that is used for the bachelor training

Key publications

- *Zhdanov, A.G.; Lunin, V.P.* Increasing validity in finding and estimating a defect geometric parameter of the heat exchanger tubes in the Nuclear Power Plants (in Russian) // MPEI Vestnik. 2008. No 5. pp. 82—88
- *Schukis, E.G.; Lunin, V.P.* Application of the fuzzy logic algorithm for analysis of the eddy current signal in the supervision heat exchanger tubes (in Russian) // MPEI Vestnik, 2008. No 5. pp. 89—93
- *Teriokhin, I.V.* About possibility of change the X-ray sensor level on eddy current (in Russian) // Supervision and Diagnostics. 2007. No 9, pp. 74—76
- *Pokrovskiy, A.D.; Teriokhin, I.V.* Industrial studies of an eddy current sensor level in the steel production (in Russian) // MPEI Vestnik. 2007. No 5. pp. 67—70
- *Vialih, I.L.; Lunin, V.P.; Bykov, D.A.; Klementieva, E.A.* Using an ultrasonic tester H-32 at handling testing of the gas pipelines // In the world of NDT 2008. 1 (33) March. pp. 42—44
- *Zhdanov A., Lunin V.* SG tubes defects 3D-profile reconstruction by the eddy current rotate or the multi-coil probe // 10th Workshop on Optimization and Inverse Problems in Electromagnetizm: Proc. Ilmenau, Germany, 2008. p. 161
- *Estimation* of the volume electroconducting postponing on the heat exchanger tube on the eddy current signal (in Russian) / V.P. Lunin, A.G. Zhdanov, A.S. Golubev et al. // Proc. of VI Intern. Conf. "Safety, efficiency and economy of atomic energy". Moscow, ROSENERGOATOM Publisher, 2008. pp. 246—248
- *Klementieva, E.A.; Bykov, D.A.; Lunin, V.P.; Golubev, A.S.* Test ultrasonic crack detector on a face lattice when supervision the welded join (in Russian) // Ibidem. pp. 248—250
- *Katankin, R.A.; Pokrovskiy, A.D.* Investigation of the eddy current converter for supervision level liquid steel (in Russian) // XVI International. sc.-tech. conf. "Information facilities and technologies". In 3 v. Moscow: MPEI Publishing House, 2008. V 1. pp. 117—124
- *Shitikov, V.S.; Pokrovskiy A.D.* Study of possibilities for the eddy current testing of the hot slab parameter (in Russian) // Ibidem. pp. 125—129
- *Schukis, E.G.; Lunin, V.P.* Application of the unceased wavelet transformations for revealing a signal from the defect (in Russian) // Ibidem. pp. 130—136
- *Zhdanov, A.G.; Lunin, V.P.* Recovering the three-dimensional defect profile under testing by the attached eddy current converter (in Russian) // Ibidem, pp. 150—151
- *Zelenskiy, M.A.; Lunin, V.P.; Brauer H.* The Study of the innovation eddy current inspection method (in Russian) // Ibidem. V. 3. pp. 20—23

Partners

- FGUP "Concern ENERGOATOM",
- Bauman Moscow State Technical University (MSTU), Moscow
- Moscow scientific production association «Spector»
- "Machine-building plant "ZIO-Podolsk", Podolsk, Moscow region
- Research-and-production association "GIDROPRESS", Podolsk, Moscow region,
- «TransNeft»
- NIKIMT, Obninsk engineering center
- VNIIAES
- Research and design institute to technology (NIKIMT), Moscow
- VIAM

- JSC "Machine-building plant "ELEMASH", corporation TVEL, Elektrostal
- Gosgortechnadzor, Russia
- JSC "GAZPROM"
- JSC "ORGENERGOGAZ", Moscow
- Federal institute of investigation and control of materials (BAM), Berlin, Germany
- Ilmenau Technical University, Germany
- Iowa State University, USA
- Fraunhofer nondestructive material investigations institute, Saar, Germany
- Konstanz high technical school, Germany

Unique equipment

- The metallization layer thickness measurement device for the electronic boards
- Defectoscope for the steel wire rope testing
- Eddy current defectoscopes for a crack detection in the components under load
- Magnetic testing conditions indicator
- Package of the training programs in the field of electrical engineering, magnetic circuits, electromagnetic field analysis, nondestructive testing
- Eddy current defectoscope with an axial through-coil converter for supervision of the nonferrous pipes TX-4400
- Multi-frequency eddy current crack detector with a matrix converter for the electric conductive objects ELOTEST PL340
- Equipment for magnetic supervision of the ferromagnetic products MP-U, WDV-10
- Magnetic device for supervision of a steel tightrope INTROS
- Eddy current defectoscope for testing the loaded details ELOTEST M2 V3
- Ultrasonic system X-32 with a matrix converter on a face lattice
- Thermovision system Thermo Tracer TH9100PWV CAT1 NEC
- Endoscopic system Snake Eye
- Pyrometer IMPAC IN15 plus
- Software for the automatic systems of the eddy current supervision of the heat exchanger tubes for the Nuclear Power Plants with WWER-440 and WWER-1000
- Software for a finite element analysis of an electromagnetic field, the designing converters and a processing diagnostic signal supervision

INSTITUTE OF RADIO ENGINEERING AND ELECTRONICS (IREE)

Institute Director

Dr. Sci. (Techn.), Professor
Nikolay N. UDALOV
Ph./fax: (495) 362-7309, (495) 362-7104, (495) 673-3522
E-mail: RTFDEK-all@mpei.ru; RTFDEK@mpei.ru

The Institute Consists of Two Faculties:

Radio Engineering Faculty of (REF)
Electronics Faculty of (EF)

Dean of Radio Engineering Faculty

Dr. Sci. (Techn.), Professor
Nikolay N. UDALOV
Ph./fax: (495) 362-7309, (495) 673-3522
E-mail: RTFDEK-all@mpei.ru; RTFDEK@mpei.ru

Departments of the Faculty:

Dean of Electronics Faculty

Ph.D. (Techn.), Associated-Professor
Valentin P. POPKO
Ph.: (495) 362-7488
E-mail: ETFDEK-all@mpei.ru; ETFDEK@mpei.ru

EF Departments:

IREE GENERATION OF OSCILLATIONS AND SIGNALS (GOS) DEPARTMENT

REF

Ph.: (495) 362-7624;
(495) 362-7795;
(495) 673-0374,
E-mail: fks@mpei.ru

At GOS Department:
15 teachers,
10 Ph.D. students.

Head of Department
Dr. Sci. (Techn.),
Professor Nikolay N. UDALOV

Main lines of research

Research Supervisor

- **Synchronization systems for the communication channels with the complex modulated and chaotic signals**
  Professors Udalov N.N., Belov L.A.
- **Theory and calculation methods of the non-linear oscillating devices and the SHF functional devices with an extremely low phase fluctuation level**
  Professor Kuleshov V.N., Associated-Professor Boldyreva T.I.
- **Frequency synthesis, radio engineering measurement and secretive communication systems using the complex wide-band signals**
  Professor Belov L.A., Associated-Professor Khil'kevich V.V.
- **Oscillations sources in the microwave and millimeter-wave ranges with a low phase noise level**
  Professor Tsarapkin D.P.
- **Design of the power non-linear units for the SHF range signals formation**
  Associated-Professor Koptev G.I.
- **Complex frequency filters in the SHF range**
  Professor Bogachev V.M.
- **Measuring and communication devices of the millimeter wave-length range**
  Associated-Professor Khriunov A.V.

Agreements, contracts, projects supported by the state budget

- Generation of the complex signals with the precision parameters
- Investigation of a potential accuracy of the chaotic signals generation, synchronization and extraction from the interference
- Investigation and development of the noise-immune secretive communication systems on the basis of the ultra-wide-band and chaotic signals
- Design and application of the precision radio signal sources for the sensors and the communication systems
- High-speed devices for generation the signals with the frequency and phase modulation
- Design and implementation of the frequency synthesizers for the SFH range
- Investigation and development of the low-noise miniature transistor UHF oscillators with an electronic frequency control

Key publications

- *Electronic* SHF devices (in Russian) / Under edition of I.V. Lebedev. Vol.2. Moscow: Radiotekhnika Publisher, 2008. P. 353—752.

- *Oscillations* generation and a radio signal formation (in Russian) / Under edition of V.N. Kuleshov, N.N. Udalov. Moscow: MPEI Publishing House, 2008. 416 p.
- *Tomashevskiy, A.I.* Computer program DIRECTMAPS for investigation the properties of the non-linear dynamic systems with a discrete time (in Russian). Moscow: MPEI Publishing House, 2008. 60 p.
- *Koptev, G.I.* Calculation, modeling, breadboard design of the low-power UHF transmitters (in Russian). Moscow: MPEI Publishing House, 2008. 70 p.
- *Kuleshov, V.N.; Perfil'ev, A.A.* Dynamics of the non-linear resonant circuits for the signal formation devices (in Russian). M.: MPEI Publishing House, 2007. 128 p.
- *Belov, L.A.* Automated control systems of the radio electronic facilities (in Russian). Moscow: MPEI Publishing House, 2007. 128 p.
- *Koptev, G.I.* Electrical converter devices (in Russian). Moscow: MPEI Publishing House, 2007. 86 p.
- *Kapranov, M.V.* Non-linear dynamic systems in a discrete time (in Russian). Moscow: MPEI Publishing House, 2007. 128 p.
- *Tsarapkin, D.P, Kononov, A.V.* Thermal Feedback in Transistor Oscillator // Proc. of EFTF-FCS-2007, Geneva. P. 563—568.
- *Tomashevskiy, A.I.; Kapranov, M.V.* Nonlinear Dynamics of the Phase Control System Modeling by the Modified Circle Map // Proc of 3rd Intern. conf. Physics and Control (PhysCon 2007). Potsdam, Germany, September 3—7, 2007. The IPACS Library.
- *Tomashevskiy, A.I.; Kapranov, M.V.* Fractal Distribution of Reverse Iterations in Maps with Chaotic Dynamics // Intern. Journal of Bifurcations and Chaos. November 2007. Vol. 17. No. 11.
- *Belov, L.A.* Modern synthesizers of the stable frequencies (in Russian). Electronic SHF devices (in Russian) / Under edition of I.V. Lebedev. Vol.1. Radiotekhnika Publisher, 2008. P. 251—268.
- *Tsarapkin, D.P.* Low-noise SHF oscillators on the basis of the bridge circuits (in Russian) / Ibidem. P. 283—299.
- Tsarapkin, D.P. Application of the dielectric cavities of the "whispering gallery waves" for SHF oscillator frequency stabilization (in Russian) / Ibidem. P. 269—282.
- *Kuleshov, V.N.; Pobedonostsev, K.A.; Mordvinov, A.E.* About one approach to increase the rate of information transfer (in Russian) // Proc. of A.S. Popov RNTORES. Scientific Session dedicated to Radio Day. Moscow: 2008. Vol. LXIII. P. 143—146.
- *Zhabin, A.S.; Kuleshov, V.N.* Investigation of the internal noise influence on operation of the frequency-phase discriminator (in Russian) // Ibidem. P. 464—468.
- *Belov, L.A.* MEMS components and units of a radio-frequency equipment (in Russian) // Electronics: NTB Publisher. 2008. No 2. P. 20—29.
- *Belov, L.A., Golubrov, A.; Mkondrashov, A.; Karutin, A.* Modulators of the SHF signals. Main classes (in Russian) // Ibidem. P. 76—83.
- *Mordvinov, A.E.; Pobedonostsev, K.A.; Kuleshov, V.N.* Increase of an information transfer rate in the communication lines by means of using the signals with mutual symbol interference (in Russian) // |MPEI Vestnik. 2008. No 4. P. 86—88.
- *Phase* shift-keying signal distortions in the non-linear resonant amplifier with an output band-elimination filter (in Russian) / L.A. Belov, V.M. Rozkov, A.V. Saprykin. // Proc. of conf. "Issues of the day of the rocket-space instrumentation and information technologies" dedicated to 50-anniversary of launching the first Earth artificial satellite. June 19—21, 2007. Moscow: Fizmatgiz Publisher, 2008. P. 151—158.

Patents

- Certificate 2007613497 on registration the computer software. Single-dimension multi-parameter discrete direct maps / Tomashevskiy, A.I. 2007.

Dissertations

- *Mordvinov A.E.* Transfer system for data with the intersymbol interference: Cand. Sci. (Techn.) Dissertation. 2008.
- *Dronov D.V.* Subsurface radar sensing of the hidden objects: Cand. Sci. (Techn.) Dissertation. 2007.

Partners

- Institute of Radio Engineering and Electronics of Russian Academy of Sciences, Moscow
- Federal State Unitary Enterprise «Osoboe konstruktorskoe buro MPEI», Moscow
- Federal State Unitary Enterprise «Russian R&D Institute of Space Instrument-Making», Moscow
- Sankt-Peterburg State Electrical University
- Scientific-Industrial Association «Vega», Moscow
- R&D Institute MicroDevice

FUNDAMENTALS OF RADIO ENGINEERING (FRE) DEPARTMENT

Ph.: (495) 362-7044,
E-mail: ORT@mpei.ru;
ort@zhoon.mpei.ac.ru

At FRE Department:
24 teachers,
8 researchers,
8 Ph. D. students.

Head of Department
Ph.D. Associated-Professor,
Viacheslav A. GRECHIKHIN

Main lines of research

Research Supervisor

- **Investigations of the acoustic properties of the thin-film and laminated materials**
  Professor Lobov G.D.; Senior researcher Zhgoon S.A.
- **Surface Acoustic Wave resonators for the materials with a natural unidirectivity**
  Professor Lobov G.D.; Senior researcher Zhgoon S.A.
- **Sensors on the basis of the acoustic wave devices**
  Professor Lobov G.D.; Senior researcher Zhgoon S.A.
- **Development of the digital signal processing in the laser systems for a flow velocity measurement**
  Associated-Professor Grechikhin V.A.
- **Optical detector characteristic investigations on the basis of the serial devices with charge coupling and development of the image processing methods**
  Associated-Professor Razumov L.A.
- **Development of methods for the spatial-temporal processing of the wideband signals in an ultrasonic flaw inspection**
  Professor Kartashov B.G.
- **Physics and technology of open and the semi-shielded dielectric waveguides, the functional units and circuits: the electrodynamics phenomena investigations and devices design — new tools for a knowledge organization and for a work with knowledge**
  Professor Vziatyshev V.F.
- **Class of the devices and circuits of the millimeter range based on the semi-shielded dielectric waveguides: new tools for a knowledge organization and for the operation with knowledge during its investigations and design**
  Professor Vziatyshev V.F.
- **Diffraction radio engineering devices and systems for the radar and diagnostic purposes, the measurements of an object position, a velocity and the parameters: fundamentals and prospects of increasing the functioning effectiveness**
  Professor Vziatyshev V.F.
- **Synthesis and implementation of the probing wave formations and reception and recognition of the informational wave formations for the multichannel radio interferometry of the high-speed processes: a description conception, a search and development of methods and devices**
  Professor Vziatyshev V.F.

- **Development of functional devices for the signal processing on the SAW basis**

  Professor Shtykov V.V.
- **Development of the algorithms of the pulse signal processing using the Hermite polynomials as a basis**

  Professor Shtykov, V.V.
- **Development the passive radar system on the basis of the PC for the security, diagnostics and object identification systems**

  Professor Shtykov, V.V.
- **Development of an universal measuring complex on PC basis for laboratory work execution for the lecture courses of the electrical and radio electronics profile**

  Professor Shtykov V.V.
- **Development of the methods and equipment for signal processing and analysis in the medical diagnostic area**

  Associated-Professor Kramm M.N.
- **Reconstruction of the current sources in area of myocardium (solution of the electrocardiography reverse problems)**

  Associated-Professor Kramm M.N.
- **Development of the automated hardware-software complexes for investigations of the radio engineering models and objects characteristics**

  Associated-Professor Pollak B.P.
- **Development and investigations of the millimeter wave devices on the highly-anisotropic gyromagnetic materials**

  Associated-Professor Pollak B.P., Leading engineer Khznzmirov, A.E.
- **Investigations of the physical and technical properties of the composite materials on the basis of the highly-anisotropic ferrites and creation of the microwave and millimeter devices on their basis**

  Associated-Professor Pollak B.P.
- **Development of devices and the functional units of a radio equipment of various applications using the ARM7 micro-processor**

  Senior lecturer Krutskikh V.V.
- **Development of the devices for gathering, transfer and processing the information on the bases of the I2C, USB, and LAN protocols**

  Senior lecturer Krutskikh V.V.

Agreements, contracts, projects supported by the state budget

- Model investigation for a propagation process of the surface acoustic waves; investigation, production and testing of structures on its basis; research and implementation of technology for a plating covering process as well as a process of sample production
- Theoretical and experimental investigations of the surface acoustic wave propagation in the piezoelectric layers
- Development of the wireless systems for a remote non-contact measurement of the physical parameters of the power engineering equipment functioning
- Investigations of methods and means for an information transmission and processing with usage of the electromagnetic, optical and acoustic waves
- Synthesis of the probing wave formations in a radio interferometry and an approach for its measurements
- Synthesis of the multi-channel probing devices; optimization of the probing waves formations and an approach for its measurements
- Diffraction radio engineering devices and systems; the fundamentals and prospects of functioning efficiency increase

Key publications

- *Morgan, D.P.; Zhgoon, S.; Shvetsov, A.S.* One-Port SAW Resonators Using Natural SPUDT Substrates // IEEE Transactions on Ultrasonics, Ferroelectrics, and Frequency Control. Vol. 54. No. 10. October 2007. P. 1936—1942.
- *Kachanov, V.K.; Kartashev, V.G.; Sokolov, I.V.; Turkin, V.V.* Problems of Extracting Ultrasonic Signals from Structural Noise during Inspection of Articles Produced from Materials with Complex Structures // Russian Journal of Nondestructive Testing. 2007. Vol. 43. No 9. P. 619—630.
- *Bhattacharjee, K.; Shvetsov, A.; Zhgoon, S.* Temperature Compensation in SAW Filters by Tri-Layer Wafer Engineering // IEEE Frequency Control Symposium. 2007. P. 189—193.
- *Bhattacharjee, K.; Shvetsov, A.; Zhgoon, S.* Packageless SAW Devices with Isolated LayerAcoustic Waves (ILAW) and Waveguiding Layer Acoustic Waves (WLAW) // Ibid. P. 135—140.
- *Bhattacharjee, K.; Shvetsov, A.; Zhgoon, S.* Cavityless Wafer Level Packaging of SAW Devices // Proc. of Intern. Ultrasonics Symp. 2007, October—November 2007, New York. P. 1886—1889.
- *Steinberg, O.M.; Shvetsov, A.S.; Zhgoon, S; Lobov, G.D.* Sensitivity and accuracy increase of the measuring system for a torsion torque of the rotating shaft with electromagnetic coupling to the SAW sensor (in Russian) // Metrologia. 2007. No 12. P. 15—25.
- *Zhgoon, S.; Tsymbal, D.; Shvetsov, A.; Bhattacharjee, K.* 3D Finite Element Modeling of Real Size SAW Devices and Experimental Validation // Proc. of Intern. Ultrasonics Symp. 2008, November 2008, Beijing, 4 pages,
- *Patel, M.S.; Bhattacharjee, K.; Reed, J.; Zhgoon, S.* Temperature Compensation of Longitudinal Leaky SAW with Silicon Dioxide Overlay // Ibidem. 5 pages,
- *Kachanov, V.K.; Kartashev, V.G.; Sokolov, I.V.; Turkin, M.V.* Problems of the supersonic signal extraction from the structured noise at an article inspection of the complex-structure materials (in Russian) / Defektoskopia. 2007. No 9. P. 71—86.
- *Sevalkin, D.A.* Mathematical modeling methods for a structural noise in a supersonic flaw detection (in Russian) // MPEI Vestnuk. 2007. No 2. P. 109—116.
- *Kartashev, V.G.; Sevalkin, D.A.* Correlation characteristics of a structural noise in a supersonic flaw detection (in Russian) // MPEI Vestnuk. 2007. No 3. P. 100—105. Kartashev, V.G.; Sevalkin, D.A., Turkin, M.V. The optimal algorithm of the spatial-temporal signal processing in a supersonic flaw detection at presence of the structural noise (in Russian) // MPEI Vestnuk.2008. No 3. P. 83—88.
- *Kartashev, V.G.; Shalimova, E,V,; Rodin, A.B.* Influence of the frequency-dependent damping and the frequency response of a converter upon the measurement errors in a supersonic flaw detection (in Russian) // Izmeritel'naya tekhnika. 2008. No 11.
- *Zhikhareva, G.V.; Kramm, M.N.* Research of possibilities of the pathologic myocardium areas localization (in Russian) // Mechatronics, automation, control. 2007. No 2. P. 46—51.
- *Zhikhareva, G.V.; Kramm, M.N.* Reconstruction of the myocardium pathological areas on the ECG-cards of the external potentials (in Russian) // Mechatronics, automation, control. 2007. No 8. P. 55 (Appendix «Machatronics and information technologies in medicine». P. 12—15).
- *Zhikhareva, G.V.; Skachkov, V.L.* Research of application possibility of the algebraic method for reconstruction of the heart bioelectrical activity sources (in Russian) // Tekhnologii zhivykh sistem. 2007. V. 4. No 2. P. 66—72.

- *Yumatov, E.A.; Kramm, M.N.; Naborodov, A.B.* Information system for true estimation of an emotional stress (in Russian) // Tekhnologii zhivykh sistem. 2007. V. 4. No 4. P. 22—28.
- *Vinokurov, D.S.; Kramm, M.N.; Lebedev, V.V.; Popov. Yu.B.* Current source reconstruction in the area of a myocardium (in Russian) // Medizinskaya tekhnika. N 4. 2008. P. 7—11.
- *Vinokurov, D.S.; Kramm, M.N.; Lebedev, V.V., and Popov, Yu.B.* Reconstruction of a Current Source in the Myocardial Area // Biomedical Engineering. 2008. Vol. 42. No 4.
- *Grechikhin, V.A.; Tolkschiov, A.V,* Hydroacoustic oscillation amplitude estimation using the laser Doppler vibration diagnostics (in Russian) // Optical methods of flow research: proc. of IX Intern. Conf. / under edition of Yu.N. Dubnischev, B.S. Rinkevichius. Moscow: MPEI Publishing House. 2007 P. 226—229.
- *Grechikhin, V.A.; Kotsuk, S.L.* Signal parameter estimation for the laser Doppler vibration meter using the wavelet analysis (in Russian) // Ibidem. P. 536—539.
- *Grechikhin, V.A.; Nechaeva, Yu.A.; Segen', A.V.* Wavelet analysis of the PIV-images of the double-phase flows (in Russian) // Ibidem. P. 540—543.
- *Grechikhin, V.A.; Maltykh, I.V.* Phase analysis method for the PIV-images (in Russian) / / |Ibidem. P. 544—547.
- *Peich, P.I.; Pollak, B.P.; Smirnov, Yu.K.; Tochilin, D.A.* Automated laboratory complex for education of the radio engineering circuits on the basis of the universal laboratory work-bench Signal-USB (in Russian) // Educational, research and engineering applications in the media of LabVIEW and technologies of National Instruments: proc of VI Intern. Conf. : Moscow: RUDN Publisher, 2007. P. 414—419.
- *About* the possibility of radio-interferometry quality growth at the gas-dynamic processes by the specially selected wave formations (in Russian) / V.F. Vziatyshev, A.L. Mikhailov, Y.I. Orekhov et al. // Proc. of Intern. Conf. «IX Kharitonov scientific lecturing». Sarov. 2007. P. 643—647.
- *Vziatyshev, V.F.; Tikhonov, A.B.; Vladimirov, S.V.; Kliachin, S.A.* Synthesis and realization of the probing wave formations for radio-interferometry of the gas-dynamic flows (in Russian) // Ibidem. P. 648—652
- *Vziatyshev, V.F.; Nikolaenko, D.V.; Chumakov, Ya,G.; Suminov, A.S.* Diffraction phenomena in a wide wave beams caused by a harmonic heterogeneity of the aperture distribution (in Russian) // Izvestiz vuzov. Fisika. 2008. No 9/2. P. 25—29.
- *Vladimirov, S.V.* Diffraction phenomena in the transverse-heterogeneous medium: a field structure in the longitudinal planes (in Russian) // Ibidem. P. 29—32.
- *Kliachin, S.A.; Danilina, M.V.; Kramich, A.P.* Wave formation motion in the transverse-heterogeneous medium: the diffraction phenomena and approaches for the aperture amplitude distribution controlling (in Russian) // Ibidem. P. 42—46.
- *Nefiodov, E.I.; Vziatyshev, V.F.; Kliachin, S.A.; Nikolaenko, D.V.; Vladimirov, S.V.* Longitudinal fields of the moved wave formations: the structural properties of the rigorous partial solution groups (in Russian) // Ibidem. P. 56—58.
- *Nikolaenko, D.E.; Suchkov, S.L.; Fin, V.A.; Shalimova, E.V.* Diffraction source interaction in the near zone: the field structure and the dynamic properties of the wave formations (in Russian) // Ibidem. P. 70—72.
- *Vziatyshev, V.F.; Smolskiy, S.M.; Orekhov, Yu.I.* Diffraction phenomena and wave formations: physics of processes and interactions in the near zone and the operation principles of devices and systems (in Russian) // Ibidem. P. 128—133.
- *About* the diffraction interactions of the wave formations in radio-interferometry of the high-speed processes: the experimental results and the research program (in Russian) / Yu.I. Orekhov; V.F. Vziatyshev, V.N. Khvorostin et al. // Ibidem. P. 133—138.

- *Vziatyshev, V.F.* High social technologies of an engineering and educational activity with knowledge and information (in Russian) // Informmost. 2008. No 2. P. 50—56.
- *Vziatyshev, V.F.* Innovation technologies of engineering and educational activity with knowledge and information (in Russian) // Izvestia AEN RF. 2008. No 2. P. 90—104.
- *Vziatyshev, V.F.* Vladimir Alexandrovich Kotek'nikov — a person of epoch: personality of scientist, engineer and citizen (in Russian) // Proc. of Intern. Conf. «CRYMiCO-2008». Sevastopol, sept. 2008. P. 27—36.
- *Diffraction* microwave and millimeter-wave radio engineering devices and systems: physics of interaction and operation principles (in Russian) / V.F. Vziatyshev, S.M. Smolskiy, Yu.I. Orekhov et al. // Ibidem. P. 475—481.
- *Kachanov, V.K.; Kartshev, V.G.; Sokolov, I.V.* Supersonic noise-immune flaw detection (in Russian). Moscow: MPEI Publishing House. 2007. 284 p.

Dissertations

- *Zhikhareva, G.V.* Development of the current source reconstruction algorithms on the basis of the measured electric potentials for an electrocardiography: Cand. Sci. (Techn.) Dissertation. 2007.
- *Sevalkin, D.A.* Spatial-temporal signal processing in a supersonic flaw detection under presence of a structural noise: Cand. Sci. (Techn.) Dissertation. 2007.

Partners

- RF MD company, Greensboro, North Carolina, USA
- JSC INVEL, Moscow
- Fomos-Materials company, Moscow
- JSC Elionica, Moscow
- Nancy University, France
- Sensor Technologies Ltd company, UK
- Impulse Consulting Ltd company, UK
- «R&D Institute of measuring systems», Nizhniy Novgorod
- «R&D Institute of accurate instruments», Moscow
- JSC «VNIIMP-VITA», Moscow

Unique equipment

- The technological complex on manufacturing of the devices on the basis of the metal, dielectric and high-temperature superconducting film materials by a vacuum deposition and a photolithography
- The automated measuring setup for research of the cryogenic UHF device characteristics
- The measuring complex for the frequency and temperature characteristic measurements for the SAW devices on the basis of Adgilent E5070A and a probe heads of Pyco-probe.
- Hardware-software bench for research of characteristics of the electrical signals and circuits
- Radio-interferometer RI-3 for diagnostics of the high-speed gas-dynamic processes and for measurement of amplitude and phase variations in the dielectric wave-guide devices in millimeter wave-range

IREE RADIO RECEIVERS (RR) DEPARTMENT

REF

Ph.: (495) 362-7384, (495) 362-7005,
fax: (495) 362-7384,
E-mail: rpu@srv-vmss.mpei.ac.ru;
GrebenkoYA@mpei.ru

At RR Department:
27 teachers,
8 researchers,
9 Ph.D. students.

Head of Department
Dr. Sci. (Techn.), Professor,
Yuri A. GREBENKO

■ Main lines of research

Research Supervisor

- **Development of the promising radar methods and means for the high-precision remote measurements of vibrations and the small displacements of the power engineering equipment elements**
  Professor Smolskiy S.M.
- **Development of the radio measuring systems and devices for the energy producing branches**
  Professors Smolskiy S.M., Bogatyrev Ye.A.]\
- **Development of the spatially distributed systems for an information acquisition, storage, remote transmission and processing**
  Professors Bogatyrev Ye.A., Grebenko Yu.A.
- **System engineering design of the microelectronic devices**
  Professor Grebenko Yu.A.
- **Digital complex filters**
  Professor Grebenko Yu.A
- **Development of the construction principles and technical means for the efficient local informational-telecommunication complexes for the executive personnel of the operative services**
  Head of R&D Lab Savkov N.N.
- **Investigation of the system engineering and circuit engineering solutions at development of the specific radio receivers**
  Head of R&D Lab Savkov N.N.
- **Development of the new principles and hardware-software facilities for the remote diagnostics of the person functional conditions**
  Senior researcher Fedorov V.A.
- **Development of the radio frequency identification devices for the access checking systems**
  Senior Researcher Trofileev A.A.
- **Development of efficiency and reliability of the technical facilities for the remote functioning monitoring of the distributed reference devices of the guard radio complex «MEGAPOLIS RK»**
  Senior researcher Filatov V.A.
- **Development of the multi-criteria methods for an object comparison and choice in the homogeneous varieties**
  Professor Kandyrin Yu.V.
- **Development of methods and algorithms for the variants ordering at various competence degree about the object technical characteristics**
  Professor Kandyrin Yu.V.
- **Development and investigation of a cooler choice method for the processor cooling**
  Professor Kandyrin Yu.V.

- **Development of the queuing methods for a radio electronic equipment withdrawal to repair on the basis of the technical quality indexes**

  Professor Kandyrin Yu.V.
- **Constructive methods to provide the electromagnetic compatibility in the radio electronic systems**

  Professor Pokrovskiy F.N.
- **Unit repair technology perfection of the modern household radio electronic equipment and development of approaches and technical facilities for the effective servicing**

  Professor Bogatyrev Ye.A., senior researcher Filatov V.A.

Agreements, contracts, projects supported by the state budget

- Development of the modern promising technologies for effectiveness increasing of the local informational-telecommunication radio complexes of the wide applications
- Investigations of the reasonable construction possibilities and development of the universal programmable receiving module of the side looking sonar
- Development of units for the specific wire communication system
- Development of interfaces between the digital units for the analogous signal processing and the commination lines
- Development of the high-speed digital demodulator of the frequency-modulated signal
- Providing the effectiveness and reliability of the technical facilities for remote functioning monitoring of the distributed reference devices of the guard radio complex «MEGAPOLIS-RK»
- Development of methods, algorithms and software for the multi-criteria variant choice
- Development of methods for the partial and linear objects ordering at queuing its repair
- Perfection of the repair technologies for the modern household radio electronic units and development of the technique and technical facilities for the effective servicing

Key publications

- *Baikov, A.A.* Investigation of the communication system noise-immunity for the wideband signals with the help of the imitation modeling (in Russian) // MPEI Vestnik. 2008. No 1. P. 124—127.
- *Bogatyrev, E.A.* Microelectronic analogous and analog-discrete devices for the signal reception and processing (in Russian). Moscow: MPEI Publishing House. 2007. 264 p.
- *Vasiliev, V.P.; Muro, E.L.; Smolskiy, S.M.* Fundamentals of a theory and a calculation of the digital filters (in Russian) /Under edition of S.M. Smolskiy. Moscow: Academia Publishing Center. 2007. 272 p.
- *Grebenko, Yu.A.; Zho Zei, Ya.* Complex active RC-filters on the identical circuits (in Russian) // Radiotekhnika. 2008. No 2. P. 26—29.
- *Kangyrin, Yu.V.; Khvatynets, S.A.* Automated multi-criteria choice of the cooling systems for processors (in Russian) // Izvestia Vogogradskogo universiteta. 2007. No 1 (27). P. 69—74.
- *Zhil'tsov, P.V.* Optimal signal choice with the digital modulation methods using the procedure of the adaptive type choice (in Russian) // Ibidem. P. 92—95.
- *Kandyrin, Yu.V.; Moskovskiy, A.E.; Shkurina, G.L.* Approach to the optimal repair queues formation on the basis of the object technical characteristics (in Russian) // Ibidem. P. 95—99.
- *Kandyrin, Yu.V.; Koshelev, A.M.* Automation of the multi-criteria alternative structuring on the basis of its consecutive ordering (in Russian) // Ibidem. P. 69—74.

- *Kireev, K.A.* Wide-band circuits designing for the systems of digital information transfer via the electrical net (in Russian) // MPEI Vestnik. 2007. No 2. P. 117—123.
- *Smolskiy, S.M.; Petrov, E.P.; Kharina, E.L.* Synthesis of the models of the multi-dimension many-valued Markov's processes (in Russian) // MPEI Vestnik. 2007. No 1. P. 114—120.
- *Smolskiy, S.M.; Votoropin, S.D.; Zakarliuk, N.M.; Noskov, V.Ya.* Is it possible to synchronize the autodyne by its own reflected signals (in Russian) // Izvestia vuzov. Fisika. 2007. V 50. No 9. P. 12—18.
- *Smolskiy, S.M.; Votoropin, S.D.; Noskov, V.Ya.* Autodyne effect in a radio-pulse oscillator (in Russian) // Ibidem. P. 24—31.
- *Smolskiy, S.M.; Votoropin, S.D.; Noskov, V.Ya.* Modern hybrid-integrated autodyne oscillators of the microwave and millimeter ranges and its application. Theoretical and experimental investigations (in Russian) // Uspekhi sovremennoi radioelectroniki. 2007. No 7. P. 3—33.
- *Smolskiy, S.M.; Votoropin, S.D.; Noskov, V.Ya.* Modern hybrid-integrated autodyne oscillators of the microwave and millimeter ranges and its application. Functional peculiarities of the autodynes (in Russian) // Ibidem. No 11. P. 3—30.
- *Smolskiy, S.M.; Ataiants, B.A.; Ezerskiy, V.V.; Shakhtarin, B.I.* Precision industrial FM short-range radar. Truncation error and its minimization (in Russian) // Ibidem. 2008. No 2. P. 3—23.
- *Smolskiy, S.M.; Ataiants, B.A.; Ezerskiy, V.V.; Shakhtarin, B.I.* Problems of noise and non-linearity of the transmitter modulation curve in the precision industrial FM short-range radar systems (in Russian) // Ibidem. No 3. P. 3—28.
- *Smolskiy, S.M.; Votoropin, S.D.; Noskov, V.Ya.* Modern hybrid-integrated autodyne oscillators of the microwave and millimeter ranges and its application. Investigation of the multi-frequency autodynes (in Russian) // Ibidem. 2008. No5. P. 65—84.
- *Smolskiy, S.M.; Votoropin, S.D.; Noskov, V.Ya.* Autodyne effect analysis in a radio-pulse oscillator (in Russian) // Izvestia vuzov. Fisika. 2008. V. 51. No 3. P. 64—70.
- *Smolskiy, S.M.; Votoropin, S.D.; Noskov, V.Ya.* Autodyne effect analysis of an oscillator with the linear frequency modulation (in Russian) // Ibidem. No 6. P. 54—60.
- *Smolskiy, S.M.; Votoropin, S.D.; Noskov, V.Ya.* Autodyne effect analysis for an radio-pulse oscillator with the frequency modulation (in Russian) // Ibidem. No 7. P. 80—89.
- *Smolskiy, S.M.; Votoropin, S.D.; Noskov, V.Ya.* External synchronization application for investigation of the internal SHF oscillator properties on the basis of its autodyne characteristics (in Russian) // Ibidem. No 9/2. P. 159—163.
- *Smolskiy, S.M., Vziatyshev, V.F.; Orekhov, Yu.I.* Diffraction phenomena and wave formations: physics of processes and interactions in the near zone and the operation principles of devices and systems (in Russian) // Ibidem. No 9/2. P. 128—132.
- *Smolskiy, S.M.; Votoropin, S.D.; Zakarlyuk, N.M.; Noskov, V.Ya.* On principal impossibility of autosynchronization of an autodyne by radiation reflected from a moving target. Springer New York ISSN 1064—8887 (Print). 2007. Vol. 50. № 9. P. 905—912.
- *Smolskiy, S.; Sheluhin, O.; Osin, A.* Self-Similar Processes in Telecommunications — John Wiley & Sons, Ltd., The Attrium, Southern Gate, Chichester, West Sussex, 2007. 314 p.
- *Shelukhin, O.I., Osin, A.V.; Smolskiy, S.M.* Self-similarity and the fractals. Telecommunication applications (in Russian) / Under edition of O.I. Shekukhin. Moscow: FIZMATLIT Publisher, 2008. 368 p.

Dissertations

- *Kireev, K.A.* Development and implementation of the signal processing algorithms for the data transfer systems through a power electrical net: Cand. Sci. (Techn.) Dissertation. 2007.

Partners

- Central R&D Institute KOMETA, Moscow
- Federal state unitary enterprise «Opytnoe konstruktorskoe buro of MPEI», Moscow
- Federal state unitary enterprise «Rossiski nauchno-issledovatelskiy institute kosmicheskogo priporostroenia», Moscow
- R&D Institute of instrumentation named after Tikhomirov V.V.; Zhukovskiy, Moscow region
- R&D Institute of Semiconductor Devices (NIIPP), Tomsk
- R&B Institute of computer complexes named after Kartsev, Moscow
- R&D Association «Altair», Moscow
- Special Scientific-Industrial Association «Eleron», Moscow
- Volgograd State Technical University, Volgograd
- Non-state Educational Enterprise TAKIR, Moscow
- R&D Center URION, Moscow
- JSC EKRAN, Zhukovskiy, Moscow region
- R&D company ZASHITA, Moscow
- R&D company TechKom, Moscow
- M-Video Service company, Moscow
- MacroTeam company, Moscow
- Academic-Research center «High-radio-technologies in medical electronics» created by RR department in Medical Instruments Institute of Yonsei University, Seoul, Republic of Korea
- SINUS-TEC Co. Ltd, Seoul, Republic of Korea
- Medical faculty of National Polytechnic Institute. Mexico

Unique equipment

- Portable measuring radar complex for the remote diagnostics of the person functional condition
- System for collection, processing and remote transmission of the technological information from the power engineering objects at increased radio interference level

IREE RADIO SYSTEMS (RS) DEPARTMENT

REF

Ph.: (495) 362-7752, (495) 362-7102,
fax: (495) 362-8938,
E-mail: rtf_rts@mail.ru

At RS Department:
13 teachers,
5 Ph.D. students.

Head of Department
Dr. Sci. (Techn.), Professor
Aleksander I. PEROV

■ Main lines of research

Research Supervisor

- **Theory, methods and algorithms of the signal processing in the equipment of the satellite navigation system consumers**

  Professor Perov A.I.
- **Development of a complex amplitude method for the statistical analysis and modeling of the radio engineering devices and systems**

  Professor Evsikov Yu.A.
- **Theory and the statistical synthesis and analysis methods of the digital radio engineering devices and systems at full and non-full a priori information**

  Professor Pervachov S.V.
- **System analysis of the complex technical systems**

  Professor Gubonin N.S.
- **Investigation of a spurious emission of the OFDM signals occurring in the non-linear sections of the transmitting and receiving devices**

  Associated-Professor Borisov V.A.

■ Agreements, contracts, projects supported by the state budget

- Investigation of the technical pattern of a receiving-computing module for an on-board equipment of a satellite navigation
- Searching investigations of the approaches for creation and ways of application of on-board and ground-based facilities providing the all-weather round-the-clock high-accurate directing of the dynamic objects with usage of the satellite radio navigation systems
- Investigation, analysis, classification and choice of the modes and the multi-station access products for the satellite multi-protocol transport network of fixed service
- Application of an orthogonal diverse on the frequency signals to increase the noise-immunity and the digital data transfer rate through the electric lines
- Application of the OFDM signals in the radio systems
- Modeling methods development for a signal distortion in the non-linear units of the on-board receiver-transmitter devices for the satellite communication and navigation
- Development and investigation of the effective methods and algorithms for adaptation of the digital radio engineering tracking systems to a priori ambiguous conditions of its operation

■ Key publications

- *Estimation* of range and velocity in the radar systems (in Russian) / V.I. Merkulov, A.I. Perov et al. Part 2. Moscow: Radiotekhnika, 2007. 304 p.
- *Perov, A.I.; Shatilov, A.Yu.* Combined single- and double-stage processing algorithm in a navigation signal receiver (in Russian) // Radiotekhnika. 2007. No 7. P. 73—79.

- *Perov, A.I.; Bakit'ko, R.V.; Boldenkov, E.N.* Optimal reception of the navigation signals with combined type of modulation by navigation and telemetric data (in Russian) // Radiotekhnika. 2007. No 7. P. 86—90.
- *Perov, A.I.; Shuvalov, A.V.* Synthesis of the processing algorithms in the receiving equipment of the navigation complexes at usage of signals with frequency-phase modulation (in Russian) // Radiotekhnika. 2007. No 1. P. 62—68.
- *Boldenkov, E.N.* Comparative analysis of characteristics of a signal reception of the satellite navigation systems with BPSK(n) and BOC(m,n) modulation (in Russian) // Radiotekhnika. 2008. No 7. P. 26—32.
- *Perov, A.I.* Optimal filtering of a phase difference of two navigation signals received in two spatially spaced points (in Russian) // Radiotekhnika. 2008. No 8. P. 76—82.
- *Boldenkov, E.N.* Comparative analysis of the algorithm for the radio navigation signal detection for BOC(m, n) modulation (in Russian) // Radiotekhnika. 2008. No 7. P. 33—37.
- *Perov, A.I.; Korogodin, I.V.* Optimal estimation of the signal angle-of-arrival at unknown initial phase by two spaced receivers (in Russian) // Radiotekhnicheskie tetradi. 2008. No 3. P. 68—72.
- *Gubonin, N.S.* Software facility for the technical solution support on the basis of comparison of a system class by Pareto (in Russian) // Information and Telecommunication technologies. 2007. No 4. P. 21—28.

Patents

- *Patent 69264 RF.* Digital receiver for the global satellite radio navigation systems / A.I. Perov. 2007.

Partners

- Federal State Unitary Enterprise «Osoboe konstruktorskoe buro MPEI, Moscow
- «Morskoy R&D Institute of radio electronics «Al'tair», Moscow
- Federal State Unitary Enterprise «Rossiyskiy R&D Institute of space instrumentation», Moscow
- Applied Problem Section. RAS

Unique equipment

- Equipment for transmission of the relay protection commands NSD550, NSD70D, NSD570
- Equipment for transmission of the relay protection commands and an anti-damage automation AES550
- Equipment of the RF communication ETL500 and SDH/PDH; telecommunication platform FOX515

IREE ANTENNAS AND RADIO WAVE PROPAGATION (ARWP) DEPARTMENT

REF

Ph.: (495) 362-7684, (495) 362-7242,
E-mail: AURRV@mpei.ru

At ARWP Department:
12 teachers,
3 researchers,
10 Ph.D. students.

Deputy Head of Department
Dr. Sci. (Phys.-Math.),
Professor Valery A. PERMIAKOV

Main lines of research

Research Supervisor

- **Mathematical modeling of the radiation the propagation processes of the pulse signals**

  Professor Permiakov V.A.
- **Analysis of propagation processes and the complex structure wave diffraction on the basis of the hybrid numerical asymptotic methods**

  Associated-Professor Solodukhov V.V.
- **New antennas construction principles for application in the modern radio engineering systems and devices of various purposes**

  Professor Sazonov D.M., Associated-Professor Bodrov V.V.
- **Quality analysis of an electromagnetic field propagation for the elementary antennas**

  Professor Permyakov V.A.

Agreements, contracts, projects supported by the state budget

- Fundamental investigations of an emission and a propagation of the ultra-wide-band
- and ultra-short pulse signals in a real medium with application to radar technologies

Key publications

- *Gusevskiy, V.I.; Gnedak, P.V.; Smirnova, S.E.* Phasing algorithms and null synthesis in the patterns of the linear and plain phased antenna arrays with the use of the an aperture orthogonal polynomial method (in Russian) // Radiotekhnicheskie tetradi. 2007. No 34. P. 38—40.
- *Bodrov, V.V.; Volodina, I.V.; Sychiov, V.V.* Investigation of the frequency properties of an axissymmetric radiator (in Russian) // Radiotekhnicheskie tetradi. 2007. No 35. P. 58—62.
- *Baskakov, A.I.; Isakov, M.V.; Kon'kina, O.V.; Permiakov, V.A.* Analysis of a resolving capacity on range of the space decimeter wave-length radar under account of the flat-flaky and spherically-flaky ionosphere (in Russian) // Radiotekhnicheskie tetradi. 2007. No 35. P. 63—67.
- *Kurushin, A.A.* Designing of antenna for a radio identifier (in Russian) // EDA Express.
- 2007. No 15. P. 28—33
- *Kurushin, A.A.* Synthesis of the SHF structures (in Russian) // Elektrodinamika i tekhnika SVCH, KVCH i opticheskikh chastot. 2007. V. 15. No 1 (43). P. 27—29.
- *Permiakov, V.A.* About longitudial electromagnetic waves. Critical analysis of the some publications (in Russian) // Ibidem. P. 30—39.

- *Permiakov, V.A.; Sorokovik, D.V.* Qualitative analysis as a whole of the vector field structure for the electric dipole in the non-stationary radiation mode (in Russian) // Nonlinear world. 2007. V. 6. No 4. P. 288—295.
- *Gnedak, P.V.; Dovbnia, I.S.* Method for a pattern correction of the reflector antenna (in Russian) // Ibidem. P. 98—101.
- *Koriukin, A.N.; Permiakov, V.A.* Qualitative analysis of the electromagnetic fields of the generalized Huygens element (in Russian) // Ibidem. 2008. V. 6. No 4. P. 296—299.
- *Permiakov, V.A.; Koriukin, A.N.* About the direct spatial-temporal description of the flat elctromagnetic impulse waves of an arbitrary polarization (in Russian) // MPEI Vestnik. 2008. No 2. P. 68—73.
- *Permiakov, V.A.; Koriukin, A.N.* Can we brush the electromagnetic hegdehog's hair? About the instantaneous and averaged in time antenna patterns (in Russian) // Antennas. 2008. No 4. P. 3—5.
- *Permiakov, V.A.; Koriukin, A.N.* Qualitative analysis of the electromagnetic field peculiarities for the elementary turnstile antenna in the sinusoidal radiation mode (in Russian) // Radiotekhnicheskie tetradi. 2008. No 36. P. 95—99.

Partners

- Institute of Radio Engineering and Electronics of RAS, Moscow
- Institute of theoretical and applied electrodynamics of RAS, Moscow
- Federal State Unitary Enterprise «Osoboe konstruktorskoe buro MPEI, Moscow
- Institute of Electrical and Electronic Engineers (IEEE), USA

IREE RADIO DEVICES (RD) DEPARTMENT

REF

Ph.: (495) 362-7248,
E-mail: BaskakovAI@mpei.ru

At RD Department:
17 teachers,
3 Ph.D. students

Head of department
Dr. Sci. (Techn.),
Professor Alexander I. BASKAKOV

Main lines of research

Research Supervisor

- **Methods and algorithms of the three-dimensional surface relief reconstruction with the help of combining of the interferometer radar with a synthesized antenna aperture and the precision radio altimeter**
  Professor Baskakov A.I.
- **Investigation and development of radar systems for the Earth and planets remote sensing**
  Professor Baskakov A.I., Associated-Professor Lukashenko Yu.I.
- **High-effective methods for an analysis and development of the digital spatial-temporal processing of a radar information**
  Associated-Professor Lukashenko Yu.I.
- **Radar systems investigation and development for the operation in a complicated interference environment**
  Associated-Professor Zhutyaeva T.S.
- **Development of the modern radar complexes for an earthquake prediction and a sub-surface anomalies detection**
  Associated-Professor Zhutyaeva T.S.
- **Theory and technique for the optimal digital generation and processing of the arbitrary radio signal forms**
  Associated-Professor Matiushin O.T.
- **Theory of the signals with a continuous angular modulation for a system of digital data transmission via the communication channels at the restricted bandwidth**
  Associated-Professor Matiushin O.T.
- **Logic algebra, the information and coding theory**
  Professor Naryshkin A.K.
- **High-accuracy laser-TV and laser-IR systems for the trajectory measurements**
  Associated-Professor Bugaev, Yu.N.
- **Network and systems for the satellite communication**
  Associated-Professor Bugaev, Yu.N.
- **Selection of the complex targets on a noise background**
  Associated-Professor Bugaev, Yu.N.
- **The problems of combining of the radio engineering and laser-TV systems for the high-accurate trajectory measurements**
  Associated-Professor Bugaev, Yu.N.
- **Laser remote radar technology for an object of the organic origin**
  Associated-Professor Briukhovetskiy A.P.
- **Investigation of the algorithms and development of the tracking and pattern recognition devices on the basis of FPGA's**
  Associated-Professor Briukhovetskiy A.P.

Agreements, contracts, projects supported by the state budget

- Investigation of the aerospace radar methods for the Earth surface relief registration
- Fundamental investigation of the radar remote sensing methods for the determination of the Earth and Ocean surface characteristics from the flying and space apparatuses
- Radio altimeter with a chirp-signal for the space monitoring of a sea surface
- Development of the double-frequency interferometry method for estimation of the water area surface condition from the small space apparatuses
- Analysis of the quality characteristics of interferometers fulfilled on the basis of a synthesized aperture radar
- Investigation and development of a digital system for the radio frequency-modulated signal search and demodulation
- Investigation of the processing algorithm and development of the noise-immune digital system for search and demodulation of the radio signals with frequency modulation on two subcarriers
- Investigation of the processing algorithm and development of the noise-immune digital system for search and demodulation of the radio signals with frequency-pulse modulation

Key publications

- ***Baskakov, A.I.; Min Ho Ka.*** Selection of Pulse Repetition Frequency in High — Precision Oceanographic Radar Altimeters // IEEE Geoscience and Remote Sensing Letters. July 2007. Vol. 4. № 3. P. 345—348.
- ***Baskakov, A.I.; Min Ho Ka, Kononov, A.A.*** Autocorrelation function of return waveforms in high precision spaceborne radar altimeters employing chirp transmit pulses // IEICE Trans. on Communications. Nov. 2007. Vol. E-90B. No. 11. P. 3237—3245.
- ***Baskakov, A.I.; Egorov V.*** Project of High Precision Satellite Radar Altimeter / Perspectives of Russia/CIS — CANADA Cooperation in Aerospace (Intern/ Seminar «Prospects of development of Russian-Canadian co-operation in aerospace area»). Moscow, MNTC. May 23—25, 2007.
- ***Baskakov, A.I.; Grishechkin, B.Yu.; Podoliaka, V.V.*** Investigation of an influence of the radio section characteristics of the oceanographic radio space-based altimeter on its accuracy features (in Russian) // Proc. of XXIV All-Russia Symposium «Radar research of nature media. Sankt-Peterburg. 2007. No 6. P. 26—33.
- ***Baskakov, A.I.; Grishechkin, B.Yu.*** Characteristics of the signal detection of the high-accurate oceanographic radio space-based altimeter (in Russian) // Aviakosmicheskoe priborostroenie. 2007. No 5. P. 37—40.
- ***Baskakov, A.I.; Vazhenin, N.A.; Grishechkin, B.Yu.*** Correlation function analysis for a reflected signal of the space precision radio altimeter (in Russian) // Izvestia vuzov Rossii. Radioelektronika. 2007. No 1. P. 53—62.
- ***Baskakov, A.I.; Grishechkin, B.Yu.*** Energy calculation of an optimal algorithm for the high-accuracy oceanographic radio space-based altimeter (in Russian) // Proc. of XXV All-Russia Symp. «Radar research of nature media. Sankt-Peterburg. 2007.
- ***Baskakov, A.I.; Grishechkin, B.Yu.*** Investigations of the main characteristics of the oceanographic space-based altimeter (in Russian): Proc. of V jubilee All-Russia conf. «Earth remote sensing from a space», IKI RAN, Moscow, 2007.
- ***Baskakov, A.I.; Egorov, V.V.*** Problems of the precision radio altimetry (in Russian) // Ibidem. 2007.

- *Information* systems and technologies: problems and prospects (in Russian) / O.V. Chernoiarov; K/I/ Shakhgeldian et al.; under edition of A.V. Babkin. Sankt-Peterburg: Polytechnical university Publisher, 2007. 592 p.

Dissertation

- *Grishechkin B.Yu.* (Special theme): Cand. Sci. (Techn.) Dissertation. 2008.

Partners

- Federal State Unitary Enterprise «Special Research Bureau of MPEI», Moscow
- Federal State Unitary Enterprise «Rossiyskiy R&D Institute of space instrumentation», Moscow
- R&D Institute of precision instrumentation, Moscow
- Institute of space investigations RAS, Moscow
- Korean Polytechnic University, Seoul, Republic of Korea

Unique equipment

- Educational workshop on the theoretical bases of the radar and navigation technologies

R&D DIVISION «GYROMAGNETIC RADIO ENGINEERING» (GRE)

Ph.: (495) 362-7958,
E-mail: kitaitsev@mpei-14.mpei.ac.ru

At GRE Division:
8 researchers

Head of GRE
Ph.D., Senior Researcher Alexander A. KITAITSEV

Main lines of research

Research Supervisor

- **Fundamental problems of the gyromagnetics**
  Professor Mikhailovskiy L.K.
- **Development of the no-current radio-absorbing materials (CRAM-technology)**
  Professor Mikhailovskiy L.K., Senior Researcher Kiktaitsev AA.
- **Application of the composite magnetic materials in microwave and millimeter ranges for an identification and the falsification protection of the various objects**
  Leading Researcher Khanamirov A.E., Senior Researcher Radchenko V.F.
- **Physical-technical properties investigation for the composite materials on the basis of a high-anisotropic ferrite and development of the microwave and millimeter range devices**
  Senior Researcher Kitaitsev A.A., Associated-Professor Pollak, B.P.
- **Development and investigation of the millimeter range devices on the basis of the high-anisotropic gyromagnetic materials**
  Associated-Professor Pollak B.P., Senior Researcher Khanamirov A.E.
- **Frequency-selective method for the signal energy parameters measurement in the microwave and millimeter wave-lengths**
  Senior Researcher Kitaitsev A.A.
- **Radio wave methods and equipment for the technological process testing and controlling**
  Senior Researcher Khanamirov A.E., Senior Researcher Puchkov I.S.
- **Investigation and development of the methods and equipment for the lengthy object measurements (cables, ropes etc.)**
  Puchkov I.S., Puchkov V.S.

Agreements, contracts, projects supported by the state budget

- Investigation of the external and internal magnetic fields influence on the properties of the composite materials with the magnetic-dielectric losses containing the micro- and nano-particles
- High-anisotropic magnetic materials for the SHF-energetic devices
- Ferrite absorbers of an electromagnetic wave energy in the SHF range
- Development of the new frequency-selective gyromagnetic absorbers of an electromagnetic emission for the unwanted oscillation suppression in the radio electronic equipment
- Development of the flat gyromagnetic layers for the electromagnetic wave energy absorption
- Local hysteresis investigation method for the ferrimagnetic structures of the small forms
- Investigation of an application possibility to use the small articles from the composite magnetic materials for identification and the falsification protection of the various objects

Key publications

- *Kitaitsev, A.A.; Zhumabayeva, G.N.; Koledintseva, M.* Method of Measuring Permittivity of Composite Materials with Hexagonal Ferrite Inclusions Electromagnetic Compatibility, 2007. EMC 2007 // IEEE International Symp. on 9—13 July 2007 P.1—6.
- *Kitaitsev, A.A.; Zhumabayeva, G.N.* Development of the varying frequency method for measurement of the composite media permittivity on the ferrite basis (in Russian) // Elektrichestvo. 2007. No 6. P. 62—64.
- *Kitaitsev, A.A.; Cheparin, V.P.; Shakirzianov, F.N.* Radio-absorbing layer from the composite material on the basis of a hexaferrite in the millimeter wave-length range (in Russian) // Proc. of XV Intern. Conf. «Radar Technology and Communication». Moscow-Firsanovka. Nov. 7—11, 2007. MPEI Publishing House, 2007. P. 320—321.
- *Kitaitsev, A.A.; Pollak, B.P., Khanamirov, A.E.* Devices on a hexaferrite in the microwave and millimeter wave ranges // Ibidem. P. 322—334.
- *Koledinseva, M.Y.; Drewniak, J.L.; Kitaitsev, A.A.; Shinkov, A.A.* Modeling and experimental study of ferrite — graphite mixture at microwave frequencies // Ibidem. P. 555—566.
- *Kitaitsev, A.A.; Lebedev, D.V.; Radchenko, V.F.* Magnetizing of the miniature articles in the transverse fields (in Russian) // Ibidem. P. 335—337.
- *Koledinseva, M.Y.; Kitaitsev, A.A.;* Analysis of interaction between a crystallographically uniaxial ferrite resonator and a hall-effect transducer // Progress in electromagnetics research, PIER 74. 2007. P. 1—19.
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- *Nano-tube* influence on the electromagnetic wave absorption in the composite radio absorbing material on the hexaferrite basis (in Russian) / A.A. Kitaitsev, D.O. Smirnov, A.P. Cheparin et al. // Ibidem. P. 387—389.
- *Kitaitsev, A.A.; Lebedev, D.V.; Radchenko, V.F.; Savchenko, N.I.* Results of the local article magnetization research by a modulation method (in Russian) // Ibidem. P. 398—405.
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- *Kitaitsev, A.A.* Permittivity measurement of the homogeneous composite magnetic materials in SHF range (in Russian) // Proc. of XII Intern. Conf. «Electromechanics, electric technologies. electrical materials and cables». MKEEE-2008. Crimea, Alushta, Ukraine, 2008. P. 56.
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- *Kitaitsev, A.A.; Smirnov, D.O.; Cheparin, V.P.; Shakirzianov, F.N.* Nano-tube influence on an electromagnetic wave absorption in the composite radio absorbing materials (in Russian) // Ibikdem. P. 96.

Partners

- RIA «ISTOK», Moscow
- R&D Institute «Domen», Sankt-Peterburg
- Concern «Phasotron», Moscow
- All-Russia R&D Institute of cable industry, Moscow
- All-Russia Institute of aviation materials, Moscow
- Plant «Moskabelmet», Moscow
- Institute of Radio Engineering and Electronics RAS, Moscow
- Mikoyan Moscow mechanical plan
- Institute of Radio Engineering and Electronics, Khar'kov, Ukraine
- State Unitary Enterprise «All-Russia Electrical Engineering Institute named after Lenin, Moscow
- Plant «Magneton», Sankt-Peterburg

Unique equipment

- Frequency-selective panoramic meter for power density of the wide-band noise signals
- High-precision meter of the lengthy articles
- Harmonic filters for the powerful UHF emission sources
- Ferrite resonant decouplers of a millimeter range

ACADEMIC-RESEARCH CENTER «MODERN RADIO ENGINEERING AND TELECOMMUNICATION TECHNOLOGIES» (MRETT)

Ph.: (495) 362-7695,
fax: (495) 362-8938,
E-mail: retfec@mpei.ru

At MRETT Center:
1 Chief-Researcher, Dr.Sci., Professor,
1 senior researcher, Ph.D.,
2 researchers, Ph.D.
1 leading engineer,
2 engineers,
2 Ph.D. students.

Supervisor
Dr. Sci. (Techn.),
Professor Alexander I. PEROV

Main lines of research

- **Statistical synthesis of the radio engineering systems and devices**
- **Adaptive radio systems**
- **Modern tracking systems in the radar and radio navigation technologies Satellite GLONASS, GPS radio navigation systems**
- **Neuron network methods and algorithms in radio engineering**
- **Radio electronic warfare**
- **Modern fast-acting communicational systems**

Agreements, contracts, projects supported by the state budget

- Execution of the technical project on creation of the consumer navigation equipment operating on signals of the prospective global navigation satellite systems
- Technical solution complex development on on-board application of the high-precision controlled artillery ammunition of the satellite radio navigation system equipment
- Theoretical and experimental researches of a high-accurate correction of the consumer equipment of the satellite navigation systems on the basis of the navigation signals
- Search investigations and a new method development for synthesis of the heterogeneous data joining algorithms from the geographically distributed heterogeneous information sources
- Development of a software for adjustment the devices and the sub-complexes
- Search investigations and development of the neuron network algorithms for recognition, identification and tracking of the complex grouped and maneuvering targets
- Investigation on creation of the noise-immune integrated navigation complexes on the basis of the adaptive spatial-time signal processing
- Investigations on creation the device for determination of the object spatial orientation parameters on the navigation signals
- Optimization of the signal processing algorithms in a geodesic equipment of the consumers of the satellite navigation systems
- Development of the technical project on the pedestrian system of the navigational distance determination on the basis of the non-radio engineering micro-mechanical sensors with support from the global satellite navigation systems

Key publications

- *Range* and velocity estimation in the radar systems/ Part 2 (in Russian) / V.I. Merkulov; A.I. Perov et al. Moscow: Radiotekhnika Publisher, 2007. 304 p.
- *Perov, A.I.; Shatilov, A.Yu.* Combined single- and double-stage algorithm for signal processing in a receiver for the navigation signals (in Russian) // Radiotekhnika. 2007. No 7. P. 73—79.
- *Perov, A.I.; Bakit'ko, R.B.; Boldenkov, E.N.* Optimal reception of the navigation signals with combined type of modulation by the navigation and telemetric data (in Russian) // Radiotekhnika. 2007. No 7. P. 86—90.
- *Perov, A.I.; Shuvalov, A.V.* Synthesis of the processing algorithms for a reception equipment of the navigation when using the frequency-phase modulated signals (in Russian) // Radiotekhnika. 2007. No 1. P. 62—68.
- *Perov, A.I.; Boldenkov, E.N.* Comparative analysis of the reception characteristics for signals of the satellite navigation systems with BPSK(n) and BOC(m, n) modulation (in Russian) // Radiotekhnika. 2008. No 7. P. 26—32.
- *Shatilov, A.Yu.* Algorithm for the receivers combining by the open-loop (in Russian) // Radiotekhnika. 2008. No 7. P. 19—25.
- *Perov, A.I.* Optimal filtering of the phase difference of two navigation signals received in the two distant-spaced points (in Russian) // Radiotekhnika. 2008. No 8. P. 76—82. Boldenkov, E.N. Comparative analysis of the detection algorithms of the radio navigation signals with BOC(m, n) modulation (in Russian) // Radiotekhnika. 2008. No 7. P. 33—37.
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- *Perov, A.I.; Shatilov, A.Yu.* Estimation of the orientation angles with usage of the satellite radio navigation systems (in Russian) // Radiotekhnicheskie tetradi. 2008. No 3.

Patents

- *Patent 69264 (RF).* Digital receiver for the global satellite radio navigation systems / A.I. Perov. 2007.

Partners

- Section of Applied Problems, RAS, Moscow
- Air Force Engineering Academy named after Zhukovskiy, Moscow
- Bauman Moscow State Technical University, Moscow
- Federal state unitary enterprise «Opytnoe konstruktorskoe buro of MPEI», Moscow
- Central Institute of Radio Electronic Systems, Moscow
- JSC «Radar MMS», Sankt-Peterburg
- «Phasotron NIIR Corporation, Moscow
- Federal State Unitary Enterprise «Rossiyskiy R&D Institute of space instrumentation», Moscow
- Design Bureau «Navigation Systems», Moscow

Unique equipment

- Programmed receiver of a satellite navigation GPS system
- Equipment for interference signal formation for the consumer equipment of the satellite navigation GPS system
- Combined navigation receiver

IREE FABRIKANT PHYSICS (FP) DEPARTMENT

FE

Ph.: (495) 362-7755,
fax: (495) 673-0859

At FP Department:
53 teachers,
8 researchers,
8 Ph.D. students.

Head of Department
Ph. D. (Techn.) Professor,
Olga A. EVTIKHIEVA

Main lines of research

Research Supervisor

- **Laser gradient refractography**
  Professor Evtikhieva O.A.
- **Applied laser optics**
  Professor Ischenko Ye.F.
- **Laser diagnostics of microflows: application in energetic and thermophysics**
  Professor Rinkevichyus B.S.
- **Statistical optics and the laser diagnostics of a turbulence**
  Professor Smirnov V.I.
- **Investigation of the inelastic electron collisions with atoms and molecules**
  Leading Researcher Smirnov Yu.M.
- **Investigation of the semiconductor laser characteristics**
  Associated-Professor Koval' O.I.
- **Computer image processing for the optical methods of a flow diagnostic**
  Associated-Professor Skornyakova N.M.
- **Optical systems with a polarization heterogeneity**
  Associated-Professor Sokolov A.L.

Agreements, contracts, projects supported by the state budget

- TFM application for investigation the influence of an optical irregularity upon the determination of the particle parameters
- Development of the theoretical basis of the refraction methods for the liquid and gas flows diagnostics with the computer optical visualization images processing obtained in the laboratory and nature experiments
- Development and implementation of the laser system for the thermal and hydro-physical processes monitoring in the boundary liquid layers
- Computer signal and image processing in the laser measuring systems
- Development of the laser refractormeter installation for determination of the boundary layer thickness
- Modern measuring technologies for the flying tests
- Development of the stereoscopic shagy background method for the heat-and-mass exchange problems
- Development of the thermographic method and equipment for checking the overheating of the power equipment and heat aggregates

Key publications

- *Fabrikant, V.A.* Selected publications (in Russian). Moscow: MPEI Publishing House, 2007. 214 p.
- *Evtikhieva, O.A.; Raskovskaya, I.L.; Rinkevichyus, B.S.* Laser refractography (in Russian). Moscow: Fizmatlit Publisher, 2008. 176 p.

- *Optical* methods of a flow investigation (in Russian) // Proc. of IX Intern. conf. / Under edition of Yu.N. Dubnischev; B.S. Rinkevichyus. Moscow: MPEI Publishing House, 2007. 570 p.
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- *Vodchits, A.I.; Orlovich, V.A.; Apanasevich, P.A.; Basiev, T.T.; Zverev, P.G.* Nonlinear optical properties of BaWO4 crystal // Optical Materials. 2007. No 29. P. 1616—1619.
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- *Experimental* investigations of the polarization characteristics distortions for the interference mirrors (in Russian) / E.B. Badamshina, O.D. Vol'pian, V.N. Kuriatov et al. // Vestnik Sanft-Peterburg AIN. 2008. No 5. P. 206—211.
- *Badamshina, E.B.; Kuriatov, V.N.; Lepioshkin, D.V.* Discreteness reduction algorithm for the rotation angle of a laser gyroscope with the reversed frequency pedestal (in Russian) // Ibidem. 2008. No 4. P. 324—332.
- *Badamshina, E.B.; Kuriatov, V.N.; Lepioshkin, D.V.* Determination of a decentering value of the spherical interference mirrors (in Russian) // Ibidem. No 5. P. 200—205.
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- *Badamshina, E.B.; Kuriatov, V.N.; Lepioshkin, D.V.* Concordance of the Gaussian beams of the astigmatic cavities with the help of a mirror (in Russian) // MPEI Vestnik. 2007. No 2. P. 137—140.
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- *Lazarev, G.L.; Orlov, D.A.; Mazalov, I.N.; Ioselev, O.K.* Smooth object micro-relief estimation with the help of the precision interference microscope-profile meter MIM-2 (in Russian) // Zavodskaya laboratoria. Diagnostika materialov. 2007. No 4. P. 39—44.
- *Lapitskiy, K.M.* Modeling of influence of a temperature field in liquid on the laser emission refraction (in Russian) // Metrology. 2008. No 7. P. 33—41.
- *Lapitskiy, K.M.; Raskovskaya, I.L.; Rinkevichyus, B.S.* Modeling of the boundary effect influence on the laser beam refraction in the temperature irregularity (in Russian) // Izmeritel'naya tekhnika. 2008. No 7. P. 28—31.
- *Nguen V.T.; Raskovskaya, I.L.; Rinkevichyus, B.S.* Application of the laser interference methods for the acoustic field diagnostics (in Russian) // Ibidem. No 1. P. 55—59.
- *Popova, E.M.; Skorhiakova, H.M.* Optical visualization of the heat-and-mass exchange processes in liquids (in Russian) // MPEI Vestnik. No 2. 2008. P. 104—108.

- *Rinkevichyus, B.S.; Evtikhieva, O.A.; Tolkachiov, A.V.* Visualization of a non-stationary convection in liquid near the heated bodies with the help of the structured laser emission (in Russian) // MPEI Vestnik. 2007. No 1. P. 65—75.
- *Rinkevichyus, B.S.; Raskovskaya, I.L.;; Tolkachiov, A.V.* Laser refractography of the optically heterogeneous media (in Russian) // Kvantovaya ekectronika. 2007. No 12. P. 53—55.
- *Smirnov, Yu.M.* Excitation of the highly lying states of the tungsten atom by the electron beat (in Russian) // Zhurnal prikladnoi spectroscopii. 2007. V. 74. No 3. P. 283—288.
- *Smirnov, Yu.M.* Excitation sections of the 1F0 — levels of the strontium atom by the electron beat (in Russian) // Ibidem. No 5. P. 557—560.
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- *Smirnov, Yu.M.* Excitation of the quintet levels of the ytterbium atom by the slow electrons // Ibidem. 2008. V. 105. No 2. P. 215—222.
- *Smirnov, Yu.M.* Excitation of the YbII transitions finishing at the low lying odd levels (in Russian) // Ibidem. 2007. V. 103. No 4. P. 553—559.
- *Smirnov, Yu.M.* Excitation of the triplet levels of the zinc atom by the electron beat (in Russian) // Ibidem. 2008. V. 104. No 21. P. 191—197.
- *Smirnov, Yu.M.* Dissociative excitation of the odd quartet S-, P-, D-, F-levels of the manganese atom at collision e-MnCl2 (in Russian) // Ibidem. 2008. V.104. No 1. P. 15—21.
- *Smirnov, Yu.M.* Excitation sections of the low-lying levels of the tungsten atom (in Russian) // Ibidem. 2008. V. 104. No 6. P. 895—903.
- *Sokolov, A.L.* Calculation of a polarization aberration by the method of a polarization-wave matrix (in Russian) // Ibidem. 2007. V. 103. No 4. P. 657—662.
- *Smirnov, Yu.M.* Excitation of the single-order ytterbium ion transitions finishing on the levels 4f13(F o7/2)5d6s (in Russian) // Teplofisika vysokikh temperatur. 2008. V. 46. No 2. P. 197—205.
- *Smirnov, Yu.M.* Dissociative MnI and MnBr excitation at an electron collision with the MnBr2 molecules // Khimicheskaya fisika. 2008. V. 27. No 2. P. 12—18.
- *Smirnov, Yu.M.* Dissociative excitation of tin at the electron collisions with SnBr2 molecules (in Russian) // Ibidem. 2007. V. 26. No 1. P. 3—9.
- *Smirnov, Yu.M.* Dissociative excitation of the singlet and seplet levels of the iron atom at the electrons collisions with FeCl2 molecules (in Russian) // Ibidem. 2007. V. 26. No 9. P. 23—28.
- *Smirnov, Yu.M.* Dissociative excitation of the black triplet levels of the nickel atom at the electron collision with NiCl2 molecules (in Russian) // Ibidem. 2007. V. 26. No 8. P. 5—10.
- *Smirnov, Yu.M.* Inelastic collisions of the slow electrons with SrBr2 molecules (in Russian) // Ibidem. 2008. V. 27. No 12. P. 24—29.
- *Smirnov, Yu.M.; Roddatis, V.K.; Temnikov, A.G.* Localization of the large-scale aerosol pollution into atmosphere (in Russian) // Grazhdanskaya zashita. 2007. No 5. P. 30—33.
- *Sokolov, A.L.* Matrix calculation method for a polarization aberration (in Russian) // Opticheskii zhurnal. 2008. V. 5. No 2. P. 16—22.
- *Sokolov, A.L., Zozulia, D.S.* Laser beams with an axial polarization structure (in Russian) // MPEI Vestnik. 2008. No 3. P. 104—108.
- *Strebkov, D.S.; Tiukhov, I.I.* Solar energetic: issues of education — from secondary school to university (in Russian) // Alternative energetic. 2007. No 5—6. P. 48—51.

Patents

- *Patent on useful model 71784.* Laboratory-research bench for investigation of the light emission and reflection concentrators with the models on the magnetic basis (variants) / K.V. Kuznetsov; I.I. Tiukhov K.B. // BI. 2008.
- *Patent on useful model 75759.* Laboratory-research bench for the characteristic studying of a solar element battery / S.I. Mazanov; V.V. Simakin, I.I. Tiukhov. // BI. 2008.
- *Patent on the request 2007120236/28(022034).* Installation for modeling the Sun motion / A.V. Smirnov, I.I. Tiukhov // BI. 2007.
- *Patent 2324122 (RF).* Solar electric plant / D.S. Strebkov; I.I. Tiukhov, M.A. Shakhram'ian // BI. 2008. No 13.

Dissertations

- *Moskalevich V.I.* Development of the optical-electronic complex for investigation of the rough surface oscillations: Cand. Sci. (Techn.) Dissertation. 2007.
- *Lepioshkin D.V.* Methods for optimization and error reduction of a laser gyrocompass: Cand. Sci. (Techn.) Dissertation. 2007.
- *Popova E.M.* Shady background method for the heat-and-mass exchange problems: Cand. Sci. (Techn.) Dissertation. 2008.

Partners

- Aerospace Center «Piaggo», Genoa & Final, Itsly
- Airport Braunschwage, Germany
- Institute of General Physics, RAS, Moscow
- Heat-and-Mass Exchange Institute, National Academy of Sciences of Belarus, Minsk, Belarus
- Thermophysics Institute, RAS Siberian Branch, Novosibirskк
- JSC ONERA», Toulouse, France
- JSC EVECTOR, Kunovich, Czech Republic
- Cranfield University, UK
- Bauman Moscow State Technical University
- Lomonosov Moscow State University, Moscow
- Germany air-space agency, Gettingen, Germany
- German Division of EUROCOPTER, Germany
- The Netherlands Aerospace Center, Amsterdam, The Netherlands
- Joint Institute of High Temperatures, RAS, Moscow
- Sankt-Peterburg state technical university
- Levedev Physical Institute, RAS, Moscow
- French Division of AirBus, Toulouse, France
- French Division of EUROCOPTER, Mariagnan, France
- Baranov Central Institute of Aviation Motors, Moscow

Unique equipment

- Fiber-optics sensors for the air-hydrodynamic flow research
- Laser automated setup for the turbulence diagnostics

- Laser refractorgraphic system for investigation of the non-stationary heat micro-processes
- Laser setup for the flow velocity field measurement with the particle image method
- Installation for the inelastic collision investigations of electrons with atoms and molecules
- Installation for the shady background method for diagnostic of the power engineering equipment overheating
- Installation for the shady background method for diagnostic of the thermal micro-processes in the boundary layers

IREE ELECTRONIC DEVICES (ED) DEPARTMENT

FE

Ph : (495) 362-7385,
E-mail: BodrovVN@mpei.ru
ed@srv-vmss.mpei.ac.ru

At ED Department:
16 teachers,
5 engineers,
4 Ph.D. students.

Head of Department
Ph. D. (Techn.),
Associated-Professor
Vladimir N. BODROV

Main lines of research

Research Supervisor

- **Engineering design and research of the vacuum and solid-state microwave devices and instruments**
  Professor Lebedev I.V.
- **Development of the new methods and facilities for ultrasonic flaw detection of the lengthy complex-structure material and products**
  Professor Kachanov V.K.
- **Development of the wide-band mosaic (composite) piezoelectric transducers for the problems of the noise-immune ultrasonic flaw detection for the composite materials and building constructions.**
  Professor Kachanov V.K.
- **Fluctuation phenomena in the electronic devices**
  Professor Vorobyev M.D.
- **Diagnostics and reliability forecasting of the electronic engineering units elements**
  Professor Vorobyev M.D.
- **Infrared imaging**
  Associated-Professor Bodrov V.N.
- **Polychromic pyrometry**
  Associated-Professor Bodrov V.N.
- **Image processing**
  Associated-Professor Obidin G.I.

Agreements, contracts, projects supported by the state budget

- Scientific foundations development of the sensor systems intellectualization with application of the special signals and the signal processing methods for research and check of the madia, processes and objects
- Development of the new noise-immune spatial-temporal signal processing methods in a ultrasonic flaw detection
- Development of the instrument arrangement complex and the nondestructive acoustic check procedures and diagnostics of the construction elements and nuclear power plant facility
- Development of the highly sensitive and highly accurate methods and facility for the ultrasonic check and diagnostics of the building materials and constructions
- Development of the methods and facility for the ultrasonic thickness measurements of the composite materials and the aeronautical engineering products
- Research of the multi-channel ultrasonic diagnostics methods of the heterogeneous building materials by the one-sided access

- Foundations development of an ultrasonic structure analysis of the constructional materials used in nuclear energetic
- Research of look-and-feel and characteristics of the versatile 3D mosaic electro-acoustic converters of wide application
- Development and research of the low-level television and thermal imaging systems
- Development and research of the work chambers for the microwave heating

Key publications

- *Bodrov, V.N.; Ishenko, S.V.* Alternative scanning mode of an infrared imager based on the pyrovidicon (in Russian) // Proc. of XV All-Russia scientific and technical conference «Modern television» Moscow, 2007, P. 67—70
- *Bodrov, V.N.; Russel, M.M.; Obidin, G.I.* Multi-channel video method of the absolute temperature determination (in Russian) // Ibidem. P. 71—75
- *Bodrov, V.N.; Russel. M.M.; Obidin, G.I.* Video method of the unknown object emissivity factor determination (in Russian) // Proc. of XVI Intern.conf. «Modern television» Moscow, 2008, P. 77—83
- *Rykov A.N.* TV-camera on the basis of the EMCCD matrix: from theory to practice // Ibidem. P. 84—86
- *Bodrov V.N.* Statistical temperature (in Russian) // Engineering and industrial mathematics review. 2007. Vol. 14 No 3. P. 515
- *Bodrov, V.N.; Russel, M.M.* Multi-channel polychromic pyrometry (in Russian) // Proc. of III All-Russia conf. of thermometry problems «Temperature-2007», Obninsk, 2007. P. 35—36
- *Bodrov, V.N.* Thermal radiation spectrum and a temperature (in Russian) // Proc. of XII Russian conf. of thermophysical substance characteristics. Moscow. 2008. P. 94—95
- *Vorobyev, M.D.; Yudaev, D.N.; Makoviychuk, M.I.* Mobile measurement arrangement for the absorption-desorption flicker-noise spectroscopy // Proc. of. Intern. Conf. «Functional Materials».Ukraine, Crimea, Partenit. Oct. 1—6. 2007.
- *Vorobyev, M.D.; Yudaev, D.N.; Glumova, M.V.; Andgelo, Ya.G.* Low frequency noise of the film electron emitters (in Russian) // Noise and degradation processes in electronic devices: Proc. of Intern. seminar. Moscow. 2007. P. 79—84
- *Vorobyev, M.D.; Yudaev, D.N.; Chirkov, M.N.* The imitation model of a contact noise (in Russian) // Ibidem. Moscow. 2008. P. 23—28
- *Yudaev, D.N.; Vorobyev, M.D.* The imitation model of a low frequency contact noise. Upon 2008. Lion, France. 2—6 June 2008.
- *Microwave* electronic devices (in Russian) / under edition of Lebedev, I.V., Moscow: Radiotekhnika Publisher, 2008. Part 1 and 2. 750 p. (Lebedev, I.V. Microwave frequencies engineering — the past, present and predictable future (in Russian). Vol. 1. P 15—28. Lebedev, I.V.; Semencha, M.V. Quasi-active protective microwave power limiter (in Russian). Vol. 2. P. 379-494. Lebedev, I.V.; Polyakov, M.Yu.; Berlin, A.S. Varactor frequency characteristics (in Russian). Vol. 2. P. 394—406
- *Lebedev I.V.* Frequency anomalies of solid-state structures (in Russian). Vol. 2, P. 665—687
- *Kachanov, V.K.; Sokolov, I.V.; Rodin, A.B.; Avramenko, S.L.* Application of the pulse packet in an ultrasonic flaw detection (in Russian) // Proc. of VI Intern. Conf. «Nondestructive check and technical diagnostics in industry». Moscow. Mashinostroenie-1, 2007. P. 202—204
- *Sokolov, I.V.; Kachanov, V.K.; Rodin, A.B.; Zaletkin, A.V.* Modified Split-method in an ultrasonic flaw detection (in Russian) // Ibidem. P. 204—207

- *Avramenko, S.L.; Kachanov, V.K.* Computer simulation of an overall and structural resonance in the irregular shape products in an ultrasonic flaw detection by the resonance technique (in Russian) // Radio electronics, electrical and power engineering: Proc. of XII Intern. conf. of graduate and PhD students. In 3 volumes. Moscow: MPEI Publishing House, 2007, Vol. 1. P. 200—201
- *Nikitinsky, N.V.; Kachanov, V.K.* Development of the ultrasonic flaw detector using the phase-shift keyed signals on the basis of a signal processor (in Russian) // Ibidem. P 210
- *Timofeev, D.V.; Kachanov, V.K.* Application of complex signal processing radio engineering methods in ultrasonic flaw detection of the lengthy complex-structured articles from concrete (in Russian) // Ibidem. P. 216—217
- *Kachanov, V.K.; Konov, M.M.; Sokolov, I.V.* Correlation directional pattern and correlation field distribution pattern of the wide-band ultrasonic converter (in Russian) // MPEI Vestnik. No1, 2007. P. 125—130
- *Kachanov, V.K.; Sokolov, I.V.* Ultrasonic check problems of the lengthy complex-structured articles with a large signal attenuation (in Russian) // Defectoscopy. No 8. 2007. P. 82—93
- *Kachanov, V.K.; Kartashev, V.G.; Sokolov, I.V.; Turkin, M.V.* Problems of ultrasonic signal extraction from the structural noise at checking of the complex-structured material articles (in Russian) // Defectoscopy. No 9. 2007. P. 71—86
- *Kachanov, V.K.; Sokolov, I.V.* Requirements to parameter selection of the wide-band converters for checking of articles with the large ultrasonic signal attenuation (in Russian) // Defectoscopy. No 11. 2007. P. 47—62
- *Kachanov, V.K.; Sokolov, I.V.* Peculiarities of complex-modulated signal application in an ultrasonic flaw detection (in Russian) // Defectoscopy. No 12. 2007. P. 18—42
- *Sokolov, I.V.* Split-method of an ultrasonic check (in Russian) // Defectoscopy. No 12. 2007. P. 3—17
- *Kachanov V.K., Kartashev V.G., Sokolov I.V.* Noiseless ultrasonic flaw detection (in Russian) M.: MPEI publishing house. 2007. P 280
- *Kachanov, V.K.; Sokolov, I.V.; Rodin, A.B.* New algorithms of the spatial-temporal signal processing in the ultrasonic thickness measurement of the concrete products (in Russian) // Proc. of VII Intern. Conf. «Nondestructive check and technical diagnostics in industry». Moscow. Mashinostroenie-1 Publisher, 2008. P. 184—186
- *Kachanov, V.K.; Sokolov, I.V.; Rodin, A.B.* The small aperture wide-band mosaic ultrasonic piezoelectric converter (in Russian) // Ibidem. P. 186—-188
- *Avramenko, S.L.* Computer simulation usage for a rough estimation of efficiency of a resonance-multiplicative method in check of the concrete building structure thickness (in Russian) // Ibidem. 2008
- *Kachanov, V.K.; Sokolov, I.V.; Timofeev, D.V.; Turkin, M.V.* Application of the spatial-temporal signal processing for the ultrasonic thickness measurement of the lengthy complex-structured products from concrete (in Russian) // Proc. of XVII All-Russia Conf. «Nondestructive check and technical diagnostics». Nizhny Novgorod, RONKTD Publisher, 2008. P. 160—161
- *Sokolov, I.V.; Kachanov, V.K.; Voronkova, L.V.* Desired signal extraction against the background of a structural noise in foundry goods by means of the radio engineering methods (in Russian) // Ibidem. P. 202—203
- *Avramenko, S.L.; Kachanov, V.K.* Development of the multi-channel acoustic thickness gage (in Russian) // Radio electronics, electrical and power engineering: Proc. of XIV Intern. conf. of graduate and PhD students. In 3 volumes. Moscow: MPEI Publishing House, 2008, Vol. 1. P. 412

- *Timofeev, D.V.; Kachanov, V.K.* Development of the multi-channel acoustic thickness gage (in Russian) // Ibidem. P. 412
- *Avramenko, S.L.* Acoustic hardware-software system of thickness measurement of the lengthy products from concrete (in Russian) // MPEI Vestnik. No 1. 2008. P. 124—127
- *Kachanov, V.K.; Sokolov, I.V.; Avramenko, S.L.* Problems of acoustical surveillance of the large-size building structures from concrete (in Russian) // Defectoscopy. No 12. 2008. P. 13—18
- *Avramenko, S.L.* Correlation method of the acoustic wave propagation velocity in the large-size compact production ftom concrete (in Russian) // Defectoscopy. No 12. 2008. P, 40—45
- *Kachanov, V.K.; Sokolov, I.V.; Avramenko, S.L.; Timofeev, D.V.* The multi-channel multiplicative method of an acoustical surveillance of the large-size compact building structures from concrete (in Russian) // Defectoscopy. No 12. 2008. P. 54—57
- *Kachanov, V.K.; Sokolov, I.V.; Avramenko, S.L.* Acoustical resonance-multiplicative method of the thickness measurement of the lengthy building structures from concrete (in Russian) // Measurement technique. No 5. 2008. P. 15—18
- *Kachanov, V.K.; Sokolov, I.V.; Rodin, A.B.* Application of signals and noise frequency separation in the noise immune ultrasonic check of the complex structure materials products (in Russian) // Defectoscopy. No 11. 2008. P. 21—30
- *Kachanov, V.K.; Sokolov, I.V.; Bakirov, M.B.; Grechikhin, V.A.* Metal structure ultrasonic diagnostics on the basis of the time signal decorrelation of the kinetic indentation acoustic emission (in Russian) // Defectoscopy. No 11. 2008. P. 47—66
- *Kachanov, V.K.; Sokolov, I.V.; Rodin, A.B.; Voronkova, L.V.* Ultrasonic check of the complex structure products from cast iron with the usage of the multifunctional hard-soft measuring system (in Russian) // Defectoscopy. No 11. 2008. P. 3—20

Patents

- *Patent on useful model MPK 7 A61 N1/44, A 61 H39/02.* Device for air-ion diagnostics, reflexotherapy and identification / V.N. Bodrov, V.N. Khristoforov, B.S. Mel'nikov. 2006.
- *Patent 77425 (RF).* Remote temperature meter for the moving object / V.N. Bodrov et al. // BI. 2008. No 29.
- *Resonance* approach of the ultrasonic thickness measurement / Positive decision on request 2007118592/28 on patent / S.L. Avramenko, I.V. Sokolov; V.K. Kachanov. 2007.
- *The request:* Correlation method for the acoustic oscillation velocity determination in the lengthy compact products of arbitrary form / V.K. Kachanov; I.V. Sokolov; S.L. Avramenko. 2008.
- *The request* 2007118592/28 dated 21/05.2007: Ultrasonic resonance thickness meter with the multiplicative signal processing / I.V. Sokolov; V.K. Kachanov; S.L. Avramenko.

Partners

- National Polytechnic Institute (INPT), Toulouse, France
- Federal center of double technologies «Soiuz», Dzerzhinsk, Moscow region.
- Federal state unitary enterprise «All-Russia R&D Institute of Nuclear Power Plants, Moscow
- Central R&D Institute of special materials, Khot'kovo, Moscow region.
- FGUP «NPP Istok», Friazino, Moscow region
- JSC «Videoscan», Moscow

Unique equipment

- Setup for metrological attestation of the high-sensitive (low-level) receivers of an optical emission
- Universal setup for testing and attestation of the electron-beam devices for the color images
- Setup for a characteristic measurement and for a metrological attestation of the piezo-electrical transducers
- Setup for thw concrete physical-mechanical characteristics measurement

LIGHTING ENGINEERING (LE) DEPARTMENT

Ph./fax: (495) 362-7494

FE

At LE Department:
20 teachers,
5 Ph.D. students.

Head of Department
Dr. Sci. (Techn.)
Associated-Professor Andrey A. GRIGORIEV

Main lines of research

Research Supervisor

- **Development and implementation of the new high-efficient gas-discharge emission sources in the visible and UV spectrum regions**
  Professor Ataev A.E.
- **Mathematical modeling methods for the emission transfer processes in the scattering and absorbing media**
  Professor Budak V.P.
- **Realistic modeling of the illumination images for the three-dimensional scenes on the PC monitor screen**
  Professor Budak V.P.
- **Optical-electronic image system parameters optimization for the image visualization on the basis of the vision organ's statistical model**
  Associated-Professor Grigoriev A.A.
- **Optical-electronic devices for medicine**
  Professor Lariushin A.I.
- **Development of methods for the illumination and the color image reproduction quality estimation**
  Associated-Professors Lebedkova S.M., Snetkov V.Yu.
- **Investigation of the receiver spectral characteristics and emission sources influence on the photometry errors**
  Associated-Professor Petrov V.M.
- **Mathematical modeling methods for the physical processes in the gas-discharge emission sources and an experimental investigation of the processes in plasma**
  Professor Reshonov S.P., Eliseev N.P.
- **Development of a high-quality light-optical system of visible and IR ranges**
  Associated-Professor Rychkov V.I., Yakushenkova T.I.

Agreements, contracts, projects supported by the state budget

- Investigation of the mathematical models for an emission reflection by the muddy medium with the arbitrary 3-D geometry and an anisotropic dispersion
- Development of an installation and the measurement methods for the luminance factors of the road covering

Key publications

- *Budak, V.P.; Korkin, S.V.* On the solution of a vectorial radiative transfer equation in an arbitrary three-dimensional turbid medium with anisotropic scattering // JQSRT. 2008. Vol. 109. P. 220—234.
- *Budak, V.P.; Korkin, S.V.* The aerosol influence upon the polarization state of the atmosphere solar radiation // Intern. J. Rem. Sens., 2008. Vol. 29. P. 2469—2506.
- *Budak, V.P.; Korkin, S.V.* The spatial polarization distribution over the dome of the sky for abnormal irradiance of the atmosphere // JQSRT, 2008. Vol. 109. P. 1347—1362.

- *Popov, O.A.; Maya, J.; Chandler, R.T.* Inductively-coupled fluorescent lamp operated at frequencies of 100 — 300 kHz and powers of 40—70 W // Light & Engineering, 2008. Vol. 16. No 2. P. 95—98.
- *Investigations* of the color parameters of the light-emission-diodes (in Russian) / M.L. Badgutdinov; E.M. Gutzeit; L.M. Kogan et al. // Svetotekhnika. 2007. No 5. P. 46—47.
- *Budak, V.P.; Bibikova, T.V.* Computer simulation of an architecture illumination (in Russian) // Svetotekhnika. 2007. No 1. P. 38—41.
- *Budak, V.P.; Zheltov, V.S.* Solution of the global illumination equation by the Monte-Carlo method with the help of the local estimates (in Russian) // MPEI Vestnik, 2008. No 2. P. 74—76.
- *Budak, V.P.; Korkin, S.V.* Method for the anisotropic part extraction for the luminance body at solution the vectorial transfer equation (in Russian) // MPEI Vestnik, 2008. No 5. P. 120—126.
- *Budak, V.P.; Korkin, S.V.* Spatial distribution modeling for a polarization degree of the emission dispersed by the atmosphere on the basis of the complete analytical solution of the vectorial transfer equation (in Russian) // Optics of atmosphere and ocean. 2008. V. 21. No 1. P. 35—41.
- *Budak, V.P.; Korkin, S.V.* The review of V Intern. Symp. On remote sensing of the Asian-Pacific region (in Russian) // Optics of atmosphere and ocean. 2007. V. 20. No 4. P. 338—396.
- *Budak, V.P.; Lubenchenko, A.V.* Accuracy and the application limits of a quasi-single dispersion at calculation of the reversed dispersed signal (in Russian) // Optics of atmosphere and ocean. 2007. V. 20. No 7. P. 577—582.
- *Budak, V.P.; Solntseva, M.A.* Illumination installation design for the sporting halls with the help of the DIALux software (in Russian) // Svetotekhnika. 2007. No 6. P. 60—62.
- *Gutzeit, E.M.* LED module analysis for the local illumination (review) // Radiotekhnika i electronika, 2007. No 12.
- *Gutzeit, E.M.; Krasnopol'skiy, A.E.; Miliutin, D.V.* Calculations of the LED modules for a local illumination (in Russian) // Svetotekhnika. 2007. No 4.
- *Maya, J.; Popov, O.A.; Chandler, R.T.* Non-ferrite induction luminescence lamp on frequencies 2,65 and 13,56 MHz at powers 80-160W (in Russian) // Svetotekhnika. 2007. No 5. P. 42—43.
- *Maya, J.; Popov, O.A.; Chandler, R.T.* Induction compact luminescence lamp with excitation frequency 100—200 kHz (in Russian) // Svetotekhnika. 2007. No 1. P. 32—36.
- *Maya, J.; Popov, O.A.; Chandler, R.T.* Induction luminescence lamp of 40-70 W power operating at frequencies 199-300 kHz (in Russian) // Svetotekhnika. 2007. No 3. P. 57—59.
- *Miliutin, D.V.; Sidorov, A.M.* Investigations of LEDs with the optical systems of the directed and circular actions (in Russian) // MPEI Vestnik, 2007. No 6.
- *Popov, O.A.* Powerful induction lamp operating at frequency 135 kHz (in Russian) // Svetotekhnika. 2008. No 5. P. 57—59.

Dissertations

- *Makarov D.N.* Computer simulation methods for the illuminating installations: Cand. Sci. (Techn.) Dissertation. 2007.
- *Melamed O.P.* Mathematical model of signals in the optical-electronic systems at the Earth surface remote sensing from a space: Cand. Sci. (Techn.) Dissertation. 2007.
- *Urusova M.V.* Structure principles of the optical systems of the optical-electronic devices on the basis of the optical panoramic units: Cand. Sci. (Techn.) Dissertation. 2007.

- *Zheltov V.S.* Illumination installation modeling on the basis of the global illumination equation solution by the local estimates of the Monte-Carlo method: Cand. Sci. (Techn.) Dissertation. 2008.

Partners

- «Lisma» company, Saransk, Mordovia
- «Elektroluch» company, Moscow
- JSC «Moscow Electrical Lamp Plant», Moscow
- Technical University of Bratislava, Slovakia
- Tsiaotong University of Shanghai, China
- Polytechnical University of Beijing, China
- Special Design Bureau of Night Vision Engineering «Orion», Moscow
- All-Russia R&D Light Engineering Institute named after Vavilov, Moscow
- Ilmenau Technical University, Germany
- Karlsruhe University, Germany

Unique equipment

- Installation for automated investigation of the spectral characteristics of the light sources and the reflected materials
- Equipment for data collecting in computer on the basis of National Instruments PCI-
- 6024E board with LabVIEW 8.1 software

IRE INDUSTRIAL ELECTRONICS (IE) DEPARTMENT

FE

Ph.: (495) 362-7422, (495) 362-7424,
fax: (495) 362-7424,
E-mail: PE-all@mpei.ru; PE@mpei.ru

At IE Department:
21 teachers,
9 Ph.D. students.

Head of Department
Dr. Sci. (Techn.),
Professor Dmitry I. PANFILOV

Main lines of research

Research Supervisor

- **Development and investigation of the electric supply sources for the discharge lamps of a high efficiency**
  Professor Panfilov D.I., Associated-Professor Polyakov V.D.
- **Microprocessor system for an illumination control**
  Professor Panfilov D.I., Associated-Professor Polyakov V.D.
- **Development and investigation of the intellectual power modules and the converter devices on its basis including with the specific characteristics**
  Associated-Professor Tsarenko A.I.
- **Development and investigation of the powerful semiconductor switches of a new technology**
  Associated-Professor Voronin P.A.
- **Investigation and development of the electric supply sources for an electronic equipment of the wide purposes**
  Associated-Professors Golikov V.Yu., Nedoluzhko I.G.
- **Development and investigation of the car electronics facilities**
  Professor Panfilov D.I.
- **Development of the microprocessor facilities for an industrial automation**
  Associated-Professor Remizevich T.V.

Agreements, contracts, projects supported by the state budget

- Measurement of the static and dynamic characteristics of the experimental modules H-IGBT in a full range of its output parameters
- Development of the power module test technique in the mode of the rigid switching Investigation and a transistor operation analysis for an inductive load
- Development of the methods for the analysis, investigations and optimization of the multi-channel transistor structures in a single-stage test mode
- Development of the educational laboratory setups for investigation of the Infineon company supply sources
- Development of the high-efficient starting-regulation devices for the economic gas-discharge illuminating lamps for the Moscow objects
- Development of the controlled electronic starting-regulation devices for the arc natrium lamps DnaT-250
- Energy saving technologies implementation in area of the street illumination using the new technologies and a modern element base
- Development of the pulse and sinusoidal signals sources for the high-voltage tests of an electric equipment
- Development of a demonstrational electronic starting-regulation device
- Development of the electric supply sources for the moving objects
- Converter development for an inherent power supply of the urban electric transport

- Electric supply systems development for the hydrogen batteries
- Development of the electric power systems for the aerodrome light engineering complexes
- Development of the special power supply sources for the powerful laser technological installations
- Development of the power supply sources for the industrial electric arc welding
- Development of the power supply sources for the xenon lamps in a projection equipment
- Development of the effective power supply sources for the personal computers
- Development of the effective power supply sources for a cellular communication equipment
- Development of a power measurement module for a system of the measurement and account of the electric energy parameters at the electric substations 35/110 kV
- Development of a diagnostic unit for a control system of the automated operation heaters 15.8106, 14.8106 and its modifications
- Development and implementation of the power sources for an unified set of the energy saving illumination devices and for the electronic components (micro-processor modules) for the street illumination control
- Analysis and development of the commutation losses reduction methods in the power semiconductor gates
- Development of the control and diagnostic system for a phase-rotator

Key publications

- *Pecheikina, M.A.; Rakov, D.L.* Hybrid transport systems using the hydrogen and solar-energy installations (in Russian) // Coll. of engineering developments. 2008. P. 434—436.
- *Poliakov, V.D.; Smirnov, E.M.* Characteristics of the luminescence lamps under the electrode heating control with the help of EPRA (in Russian) // Svetotekhnika. 2008. P. 46—49.
- *Rashitov, P.A.; Remizevich, T.V.* Micro-processors of the Cold Fire family (in Russian) // Novosti elekroniki. 2008. No 6 (52). P. 11—19.
- *Arkhipov, A.M.* Modern solutions for the electric drive control systems (in Russian) // Ibidem. P. 19—23.
- *Akimenko, A.G.* New processors of the QUICCIIPRO family — a modern solution for the communication devices (in Russian) // Ibidem. P. 26—28.
- *Arkhipov, A.M.* Complex solution for the recharge systems for the Li-Ion and the Li-polimer rechargeable batteries (in Russian) // Ibidem. P. 28—32.
- *Arkhipov, A.M.* New generation of sensors with a digital output (in Russian) // Ibidem. P. 32—35.
- *Tsarenko, A.I.; Seriogin, D.A.* New principle of the electrical energy static converter structure (in Russian) // MPEI Vestnik. 2008. No 1. P. 98—104.
- *Tsarenko, A.I.; Seriogin, D.A.* Development of converter circuit engineering with the closed input (in Russian) // MPEI Vestnik. 2008. No 1. P. 98—104.

Patents

- *Patent 78024 (RF)* on a useful model «The controlled electronic start-regulating apparatus» / V.D. Poliakov; A.I. Poliakov. 2008.
- *Patent RU 74533 U1 (RF)* on a useful model «Semiconductor device of gate type». Published / P.A. Voronin; N.P. Schepkin // BI. No 18. 2008.

Dissertations

- *Nguen Hai Ning.* Research and development of the multiplex electro-packet control system for the cars of a new generation: Cand. Sci. (Techn.) Dissertation. 2008.
- *Seriogin, D.A.* Research and development of the electrical energy static converters with a choke-capacitor inverter: Cand. Sci. (Techn.) Dissertation. 2008.
- *Smirnov, E.M.* Analysis and development of the micro-processor control systems for electric converters for the internal illumination needs: Cand. Sci. (Techn.) Dissertation. 2008.
- *Kondratiev, D.E.* Three-phase rectifiers with an active correction of a power factor and with the two-way energy transfer: Cand. Sci. (Techn.) Dissertation. 2008.

Partners

- «ElTom» company, Tomilino town, Moscow region.
- JSC «R&D Institute of Distant Radio Communication», Moscow
- JSC «Transvit», Nizhnii Novgorod.
- «Nizhegorodskiy zavog Frunze», N. Novgorod
- JSC «Zavod Stella», Zelenograd
- JSC «Reconstruction of greenhouses», Moscow
- «GE Lighting» company, USA
- «Infineon Technologies AG» company, Germany
- State Unitary Enterprise «Prozhektor», Moscow
- R&D Kino-Photo Institute, Moscow
- R&D Center of Technological Lasers, Shatura, Moscow region
- «Blesk-NVF» company, Moscow
- State Unitary Enterprise «All-Russia Electrical Engineering Institute named after Lenin,
- Moscow
- ABB Metronix, Moscow
- JSC «AVTOVAZ», Toliatti
- «LIAZ» company, Moscow region
- «KAMAZ» company, Naberezhnye Chelny R&D Institute «Avtoelektronika», Moscow «Elektromodul'» company, Belarus
- R&D I PRORYV, Zhukovskiy, Moscow region
- PRAMO Plant, Moscow
- AVTOELEKTRONIA Plant, Kaluga
- R&D I BOLID, Korolev, Moscoq region.

Unique equipment

- Laboratory complex of a power equipment of «Apator SA» company, Poland Laboratory-research complex of Motorola company, USA
- Intellectual-integrated modules of Mitsibishi company, Japan
- Digital phosphor oscilloscope of Tektronix company series TDS3054 (pass-band 500 MHz)
- Universal measurement complex for the dynamic parameters of the power transistors (single-test mode, communication of the digital measuring data to PC, software control)

IREE SEMICONDUCTOR ELECTRONICS (SE) DEPARTMENT

FE

Ph.: (495) 362-7168,
E-mail: PPE-all@mpei.ru;
PPE@mpei.ru

At SE Department:
15 teachers,
5 researchers,
5 Ph.D. students.

Head of Department
Dr. Sci. (Ttechn.), Professor,
Honoured Researcher of RF
Anatoly I. POPOV

Main lines of research

Research Supervisor

- **Physics of the non-crystalline semiconductors and devices on its base**
  Professors Popov A.I., Voronkov E.N.
- **Electronic microscopy, scanning tunnel and atomic-forced microscopy**
  Professor Popov A.I.
- **Development of the semiconductor sensors and investigation of the electric-physical and noise properties of the semiconductor devices and structures**
  Professor Guliaev A.M.
- **Investigations of the semiconductor compounds of the A2B6 type and the devices on its base**
  Professor Morozova N.K.
- **Investigation of the MDS structures and the field-effect-transistor properties on the Si base**
  Professor Soldatov V.S.
- **Optical modulation spectroscopy of the semiconductors**
  Associated-Professor Khirin V.N.
- **Development of the powerful semiconductor devices**
  Associated-Professor Charykob N.A.
- **Solid-state UHF electronics**
  Professor Shnitnikov A.S.
- **Electronic spectroscopy of the semiconductor surfaces**
  Associated-Professor Varlashov I.B.
- **Receivers of the IR emission**
  Professor Miroshnikova I.N.

Agreements, contracts, projects supported by the state budget

- Electronic-microscopic and electronic-graphical investigations of the semiconductor materials
- Investigation of the nano-crystalline and amorphous semiconductor films and the structures on its basis
- Investigations of phenomena caused by carriers heating in the channel of MDS transistors and development of monitoring methods for MDS ultra-large IC stable to the «hot» carriers effects
- Investigation of heterogeneous reactions on the semiconductor material and structure surfaces

Key publications

- *Popov, A.I.* Physics and technology of the disordered semiconductors (in Russian) / A.I. Popov. Moscow: MPEI Publishing House, 2008. 272 p.
- *Voronkov, E.* Calculation of threshold voltage for phase-change memory device. Journal of Non-crystalline Solids. 2007. Vol. 353. № 6. P. 2591—2594.
- *Voronkov, E.N.* Switching voltage of the memory elements with the phase transitions (in Russian) // MPEI Vestnik. 2007. No 4. P. 105—108.
- *Isothermal* current-voltage characteristics of high-voltage silicon carbide rectifier p-i-n diodes at very high current densities / M.E. Levinshtein, T.T. Mnatsakanov, P.A. Ivanov et al // Semiconductor Science and Technology. 2007. Vol. 22. N 3. P. 253—258.
- *Steady* state self-heating and dc current-voltage characteristics of high-voltage 4H-SiC p+-n-n+ diodes» / M.E. Levinshtein, T.T. Mnatsakanov, P.A. Ivanov et al // Solid-State Electronics. 2007. Vol. 51. N 6. P. 955—960.
- *Mnatsakanov, T.T.; Levinstein, M.E.; Tandoev. A.G.; Yurkov, S.N.* Peculiarity of a dynamic injection and the modulation processes of the base layer in the powerful n+-p-p+ structures (in Russian) // Fisika i tekhnika poluprovodnikov. 2007. V. 41. No 11. P. 1401—1407.
- *Morozova, N.K.; Mideros, D.A.* To influence on the self-activated ZnSe luminescence (in Russian) // Izvestia vuvzov. Elektronika. 2007. No 3. P. 12—17.
- *Koziukhin, S.A.; Voronkov, E.N.* Some properties determination of the amorphous chalcogenide semiconductor from the thermal-field electric conductivity functions (in Russian) // Non-organic materials. 2008. V. 44. No 11. P. 1—4.
- *Mnatsakanov, T.T.; Levinstein, M.E.; Freidlin, A.S.* Auger-recombination influence on the thermal stability of the powerful high-voltage semiconductor diodes (in Russian) // Fisika i tekhnika poluprovodnikov. 2008. V. 42. No 2. P. 220—227.
- *Self-heating* and loss of thermal stability under a single current surge pulse in high-voltage 4H-SiC rectifier diodes / M.E. Levinshtein, T.T. Mnatsakanov, P.A. Ivanov et al / / Semiconductor Science and Technology. 2008. Vol. 23. N 8. 085011.
- *Ivanov P.A., Levinshtein M.E., Mnatsakanov T.T.* Bipolar devices based on Silicon Carbide: physical issues // Progress in Solid State Electronics Research» ed. by J.P. Maringale, Nova Science Publishers. 2008. P. 95—125.
- «*Self-heating* and destruction of high-voltage 4H-SiC rectifier diodes», «Solid-State Electronics» / M.E. Levinshtein, P.A. Ivanov, T.T. Mnatsakanov, J.W. Palmour, M.K. Das, D.F. Hull. 2008. V. 52. N 11. P. 1802—1805.
- *Guliaev, A.M.; Le Van Van; Sarach, O.B.; Mukhina, O.B.* About of the optical emission influence on the gas sensor sensitivity on the basis of the the SnO2-X films (in Russian) // Fisika i tekhnika poluprovodnikov. 2008. V. 6. P. 742—746.
- *Guliaev, A.M.; Le Van Van; Sarach, O.B.; Mukhina, O.B.* Sensitivity and selectivity increase for the gas sensors on the basis of the SnO2-X filmes emitted by the LED (in Russian) // Izmerital'naya tekhnika. 2008. No. 8. P. 44—57.

Dissertations

- *Namestnikov D.Yu.* Three-channel detector on the basis of the distributed feedback of the InGaAs hetero-junction lasers for monitoring: Cand. Sci. (Techn.) Dissertation. 2007.
- *Mideros Mora Daniel Alejandro.* Optical properties of the A2B6 compounds with the iso-electron oxygen admixture from the point of view of the theory of the non-crossing zones: Cand. Sci. (Phys. Math.) Dissertation. 2008.

Partners

- State unitary enterprise «Alfa», Moscow
- Research-Industrial Association «Pulsar», Moscow
- JSC Moscow Plant Sapphire, Moscow
- R&D Institute of material sciences, Zelenograd
- R&D Institute of molecular electronics, Zelenograd

Unique equipment

- Complex for investigation of the solid state surface chemical structures by methods of X-ray electronic-, Auger-, UV- and mass-spectroscopy LHS-10
- Complex for the charging phenomena investigations in the MDS structures and transistors by methods of the volt-farad characteristics, thermo-stimulated ion currents, charging pumping
- Automated complex for investigations of the semiconductor structures and devices noise features
- Installations for the optical properties investigations of the semiconductor materials by methods of IR-and electric modulation spectroscopy and spectrometry
- Technological equipment for the thin dielectric and semiconductor film mapping by methods of the ion-plasma, ractive-cathode and thermal sputtering
- Complex for the gas sensors investigations
- Raster and transparent electronic microscopes
- Tunnel microscope
- Atom-force microscope

DEPARTMENTS UNDER RECTORATE

HISTORY AND CULTUROLOGY (HC) DEPARTMENT

Ph.: (495) 362-7423

At HC Department:
18 teachers

Head of Department
Dr. Sci. (History), Professor Marina I. SMIRNOVA

■ Main lines of research

Research Supervisor

- **Evolution studying of the person, the societies and the civilizations: human being in a history and the history of routine**
  Professor Smirnova M.I., associated-professor Krasnova L.I.
- **Political relations in the Russian society: power, democracy, personality**
  Professor Smirnova M.I.
- **Civilization changes in the modern Russia: spiritual processes, values and ideals**
  Associated-Professor Ermishina N.D.
- **Computer technologies in an education and the information culture formation**
  Associated-Professors Krasnova L.I., Vinogradova G.Z., Professor Smirnova M.I.
- **Economical history of Russia and the history of the Russian economic thoughts**
  Associated-Professor Kotiukova T.V.

■ Agreements, contracts, projects supported by the state budget

- Participation in the inter-university program of development of the electronic educational resources in the limits of 1.1.6.1 innovation project implementation, theme 7011680; the lecture courses "Native History", and "Fundamentals of Humanitarian Knowledge"

■ Key publications

- *Native* history. IX — beginning of XXI centuries. Lecture course (in Russian) / Under edition of M.I. Smirnova. Moscow: MPEI Publishing House, 2007. 640 p.
- *Reading-book* on the native history from the oldest timed to beginning of XXI century (in Russian) / Under edition of L.I. Krasnova. Moscow: MPEI Publishing House, 2007. 232 p.
- *Chernobaev, A.A.* At reception at Stalin (Note-books, journal of the Stalin private office visitors) (in Russian). Moscow: Novyi khronograph Publisher, 2008. 960 p.
- *Chernobaev, A.A.* Russian historians. Iconography (in Russian). Moscow: Loving Russia Publisher, 2008. 416 p.
- *Kotiukova, T.V.* Turkestan direction of the Parlament policy in Russia in 1905—1917 (in Russian) Moscow/ RTUTIS Publisher, 2008. 260 p.
- *Smirnova, M.I.; Dmitrieva, I.A.* Socio-cultural bases of the historiographic discurse (in Russian) // Stalinism historiographic: Coll. of papers / under edition of N.A. Simomia. Moscow: ROSSPEN Publisher, 2007. 403 p.
- *Mikhailov, A.N.* Philosophical conceptualism of a fantastical phenomenon (in Russian) / / RUDN Vestnik. Series Philosophy. 2008. No 4.
- *Loparev, A.V.* Conflikto-logical competence as the component of a specialist-professional in the state management (in Russian) // Actual problems of modern sociology and politology: coll. of paper, Lomonosov MSU. Issue 2. / under edition of L.N. Pankova. Moscow. MAKS Press Publisher, 2008.
- *Regional* regents of Russia. 1719—1739. (in Russian)/ Moscow. ROSSPEN Publisher, 2008. 832 p.

Patents

- *Author Certificate 2007610126.* Multimedia lecture course "Native history" as the computer program / N.P. Bykova; R.V. Volkova; L.N. Demidonova. 2007.

Dissertations

- *Mikhailov A.N.* Fantastic phenomenon; philosophy-culturology analysis: Cand. Sci. (Philos.) Dissertation. 2008.

PHILOSOPHY, POLITOLOGY AND SOCIOLOGY (PPS) DEPARTMENT

Ph.: (495) 362-7707, (495) 362-7654, (495) 362-7915,
Ph/fax: (495) 362-7209

At PPS Department:
31 teachers,
2 engineers.

Head of Department
Dr. Sci. (Philos.), Professor Andrey L. ANDREEV

Main lines of research

Research Supervisor

- **Modern society: Russia in the global context**
  Professor Andreev A.L.
- **Sociology and philosophy of education**
  Professor Andreev A.L.
- **Sociology of engineering**
  Professor Andreev A.L.
- **Modern problems of the social philosophy**
  Professor Arefieva G.S.
- **Science and technology philosophy**
  Professor Pechionkin A.A.
- **Comparative politology**
  Associated-Professor Chepel' S.L.
- **Ethic problems**
  Associated-Professors Malinovskaya N.M., Tkachenko O.V.
- **Modern Russian youth**
  Associated-Professor Selivanova Z.K.

Agreements, contracts, projects supported by the state budget

- Anthropity principle in designing and developing of the socio-technical systems
- Engineering philosophy

Key publications

- *Andreev, A.L.* Russian education: the social-historical contexts (in Russian). Moscow: Nauka Publisher, 2008. 368 p.
- *Pechionkin, A.A.* Leonid Isaacovich Mandelshtamm (in Russian). Moscow: Nauka Publisher, 2008. 320 p.
- *Engineering* philosophy: classical, post-classical, post-non-classical. Dictionary (in Russian) / under edition of B.I. Kudrin. Moscow: Tekhnetica Publisher, 2008. 209 p.
- *Andreev, A.L.* Modern Russia: request on the competent official (in Russian) //Social sciences and the present. 2007. No 1.
- *Andreev, A.L.* Studying of the youth cinema audience (in Russian) // Artmanager. 2007. No 1 (15).
- *Andreev, A.L.* Values and world outlook aspects of the social inequality (in Russian) // Sociology investigations. 2007. No 9.
- *Andreev, A.L.* Social inequality in the public opinion of Russians (in Russian) // RAN Vestnik. 2007. V. 77. No 8.
- *Andreev, A.L.* Learning as a blessing and a duty (in Russian) // Pedagogic. 2007. No 10.

- *Andreev, A.L.* Socio-technical designing and some education problems in the technical universities (in Russian) // MPEI Vestnik. 2007. No 10. P. 148—155.
- *Andreev, A.L.* Problem of a Russian identity and the modern movies process (in Russian) // Theory of artistic culture. 2008. No 11.
- *Andreev, A.L.* Movie theater as a resource of a Russian identity (thoughts on the materials of the sociological investigations) (in Russian) // Ibidem.
- *Andreev, A.L.* Image of Russia and image of West in the Russians sense (in Russian) // RAN Vestnik. 2008. V. 78. No 4.
- *Andreev, A.L.* Modern Russian identity: the foreign policy measurement (in Russian) // World economy and international relations. 2008. No 7.
- *Andreev, A.L.* Image of Russia and image of West in the Russians sense (in Russian) // Filosofia khoziastva. 2008. No 1.
- *Andreev, A.L.* Education development succession in pre-revolution and soviet Russia (in Russian) // Pedagogic. 2008. No 6.
- *Andreev, A.L.* Social splits in the modern Russia (in Russian) // Tribuna russkoi mysli. 2008. No 9.
- *Andreev, A.L.* Citizen and official: two images of Russia (in Russian) // Ibidem. No 8.
- *Andreev, A.L.* Sharikovs begin to decline. Life priorities in our society are fast changing (interview) (in Russian) // Rossiiskaya gazeta. 05.03.2008.
- *Kalinin, E.Yu.* Mutual evolution concepts; a myth or a reality (in Russian) // Universal'nyi evoliutsionism i global'nye problemy. 2007.
- *Kalinin, E.Yu.* Problem of an observer in a modern science (in Russian) // Einstein and prospects of science development. 2007.
- *Kalinin, E.Yu.* Philosophical-methodological analysis of oscillations and waves theory (in Russian) // MPEI Vestnik. 2007. N 5.
- *Kalinin, E.Yu.* Post-classical conflictology (in Russian) // Conflictology problems. 2007. No 2.
- *Modern* virtualization (in Russian) / A.A. Pechionkin // Possible worlds in science history. Moscow: Nauka Publisher, 2008.
- *Pechionkin, A.A.* Explanation as a problem of a science philosophy of XX century (in Russian) // Metogologia i istoria psikhologii. 2008. V. 3. No 1.
- *Pechionkin, A.A.* Review on the book «Anna Patova. Mathematics. A compass into Reality. Three alternatives. Nisson academic. 2007» (in Russian) // MSU Vestnik. 2008. Series 7. No 3.
- *Pechionkin, A.A.* Gnoseology. Science. Epistemology // Engineering philosophy: classical, post-classical, post-non-classical. Dictionary (in Russian) Moscow: Tekhnetika Publisher, 2008.
- *Selivanova Z.K.* Perpetual values. Cultural background of an international competence (in Russian) // Psikhologia rukovoditelia. 2008. No 2.

Partners

- Russian Academy of Education, Moscow
- Departments of philosophy and sociology of the technical universities of Moscow (in the limits of the Association of Departments of social sciences of technical universities)

RESEARCH CENTER «WEAR-RESISTANCE»

RESEARCH CENTER «ENERGY EQUIPMENT WEAR-RESISTANCE INCREASE FOR ELECTRICAL STATIONS» (RC «WEAR-RESISTANCE»)

Ph.: (495) 362-7458,
(495) 362-7578,
(495) 362-7718,
fax: (495) 362-7578,
E-mail: inc@inc.mpei.ac.ru,
Internet site: http//inc.mpei.ac.ru

At RC Wear-Resistance:
13 researchers,
31 engineers and technicians,
3 Ph.D. students.

RC Director,
Winner of RF Government Award,
Dr. Sci. (Techn.),
Professor Viacheslav A, RYZHENKOV

Main lines of research

Research Supervisor

- **Construction material erosion and corrosion processes research, development of the surface protection methods of the thermal power equipment for TPP, NPP and the heat supply systems against the aggressive influence of the operating conditions and environment**

  Professor V.A. Ryzhenkov
- **Identification and a surface-active substance concentration in a water medium of the various purpose**

  Professor V.A. Ryzhenkov
- **Hydrodynamic processes research and development of the tubing system hydraulic resistance decrease methods**

  Professor V.A. Ryzhenkov
- **Investigation of the interaction processes of the liquid particles with a hard surface**

  Professor Selezniov L.I.
- **Resource and operation reliability increase of the power engineering equipment on the basis of the high-effective nano-composite materials usage**

  Senior researcher Kachalin G.V.
- **Exploitation effectiveness increase for the heat-supply and the heating systems**

  Senior researcher Pogorelov S.I.
- **Research of the thermal-barrier deposit formation processes on the equipment of the heat-exchange surfaces, development of methods for elimination and prevention of the deposit and corrosion products formation**

  Senior researcher Kurshakov A.V
- **Determination of an erosion-resistance of the constructive materials and a protective covering at a high-speed interaction with the liquids**

  Senior researcher Bodrov A.A.
- **Hydrodynamic research of the dynamic pump setting, development of the methods for exploitation reliability increase of the pumping equipment for the thermal power engineering objects**

  Professor Volkov A.V.

- **Development of the highly-effective hydrodynamic recyclable systems for the electrical energy produce on the basis of the redundant main pressure of the technological liquids**

Professor Volkov A.V

Agreements, contracts, projects supported by the state budget

- Power saving up technology of the transportation, the distribution and the consumption of heat
- Increase of the profitability and reliability of the pump equipment work of TPP and the heat supply systems on the basis of the advanced domestic and foreign achievements
- Deposition of a protective layer for decrease in the erosive wear of the shovels of the turbines and a smoke sucker
- Development of a highly effective technology of decrease in the power inputs for piping transportation of the working and technological mediums
- Development of the technological bases of the elements of a new generation heat supply system, providing the power decrease
- Research of the destruction processes, composition and structure of the perspective materials and the nano-composite coatings with usage of the unique experimental installation complex «Hydraulic shock installation Erosion-M»
- Development and creation of an universal installation for restoration of the functional properties of the internal surfaces of the hot water supplying pipelines, losing a protective zinc layer
- Development of a method and technology of its realization for decrease in an erosion wear of the blades stage of the powerful steam turbines
- Development of a highly effective clearing method of the oil systems surfaces of the turbine units
- Modernization of the preservation schemes of the turbines of ATETS-2
- Modernization of the network water processing schemes on the small boiler-houses
- Low thermal conductivity coatings decision for the high-temperature turbine blades
- Technologies development and coating deposition on the pre-production model element of a steam turbines flowing part
- Anti-corrosive processing of the planting pipelines of the heating systems KTC-18
- Increase of the operation efficiency of the power units by means of perfection of the water recycling supply systems in the conditions of a real operation on TPP of JSC Mosenergo
- Hydrodynamics and the heat exchange mathematical modeling of twisted flows of the heat-carriers (a liquid, gas)

Key publications

- *Zonov, A.A.; Sergeev, V.D.' Dubrovsky. I.Ya.* Preservation of the peak water-heating boiler by an octadecylamin in the static method for a long term (in Russian) // New in Russian electric power industry. 2007. No 3. P. 44—47.
- *Sergeev, V.D.; Nikishov, K.S.; Zonov, A.A.; Dubrovsky-Vinokurov I.Ya.* About characteristic properties of an octadecylamin (in Russian) // MPEI Vestnik. 2007. No 4. P. 27—31.
- *About* increase of efficiency of the heat supply city systems operation on the basis of the SAS-technologies (in Russian) / V.A. Ryzhenkov, A.V. Kurshakov, A.V. Ryzhenkov, et al.// News of heat supply. 2007. No 12. P. 45—50.

- *Volkov, A.V.; Parygin, A.G.; Ryzhenkov, V.A.; Scherbaks, S.N.* Electrical energy generation in the warmly – and water supply systems on the basis of the redundant main pressure recuperation of the technological liquids (in Russian) // Ibidem. No 10. p. 46-50.
- *Ryzhenkov, V.A.; Volkov, A.V.; Parygin, A.G.* Recuperation installations based on the dynamic pumps is one of the effective ways to increase of a profitability and a reliability of the equipment operation of the central heat supply station (in Russian) //Municipal Complex of Moscow region. 2007. No 4. P. 42—43.
- *Kachalin, G.V.; Ryzhenkov, V.A.; Ter-Arutjunov, B.G.; Mednikov, A.F.* Hardening of the stop-regulating fitting elements by means of the ionic-plasma technologies (in Russian) // Technology of metals. 2007. No 4. P. 19—21.
- *Seleznev, L.I.; Ryzhenkov, V.A.* Erosive wear of the constructional materials (in Russian) // Ibidem. No 3. P. 19—24.
- *Ryzhenkov, V.A.; Sedlov, A.S.; Ryzhenkov, A.V.* Usage of the surface-active substances for decrease of a hydraulic resistance of the pipelines of the heat supplies systems (in Russian) // MPEI Vestnik. 2008. No 1. P. 41—47.
- *Volkov, A.V.; Parygin, A.G.; Tchernyshev, S.A.* Hydrodynamic interaction characteristics of a working flow with a part of a hydrofobic surface of the centrifugal pumps (in Russian) // Power savings and water preparation. 2008. No 1 (51). P. 53—55.
- *Ryzhenkov, V.A.; Kurshakov, A.V.; Anahov, I.P.; Sviridov, E.B.* About effectiveness of increase of operation and reliability of the condensers of the steam turbines (in Russian) // Ibidem. No 2 (52). P. 29—34.
- *Kurshakov, A.V.; Nefedkin, S.I.; Ryzhenkov, V.A.; Scherbaks, S.N .* Parameters definition of efficiency of the film-forming corrosion inhibitors (in Russian) // New in the Russian electric power industry. 2008. No 7. P. 38—43.
- *Volkov, A.V.; Pankratov, S.N.; Tchernyshev, S.A.* The increase of the centrifugal pump characteristics based on the teflon coating application (in Russian) // MPEI Vestnik. 2008. No 1. P. 9—13.
- *Ryzhenkov, V.A.; Kurshakov, A.V.; Anahov, I.P.* The increase of exploitation effectiveness of the steam turbine condensers based on the surface modification with use of the surface-active substances (in Russian) // New in the Russian electric power industry. 2008. No 5. P. 27—33.
- *Volkov, A.V.; Petrikov, S.A.; Popov, V.C.; Hovanov, N.N.* Development of the heat transfer intensification methods in a matrix of the water-heating boilers and the heat exchange apparatuses (in Russian) // Heavy mechanical engineering. 2008. No 10. P. 12—15.

Patents

- *Patent. 62178 (RF)* System of transportation of the liquid environments on the pipeline nets / V.A.Ryzhenkov, S.I.Pogorelov, A.V.Ryzhenkov // BI. 2007. No 9.
- *Patent. 62218 (RF)* Heat supply system / V.A.Ryzhenkov, S.I.Pogorelov,M.V.Lukin // BI. 2007. No 9.
- *Patent. 2318140 (RF)* A method of the hydraulic resistance reduction for the transportation networks of the liquid media / V.A.Ryzhenkov, A.V.Volkov, S.I.Pogorelov, A.V.Ryzhenkov // BI. 2008. No 6.
- *Patent. 2323390 (RF)* Heat supply system / V.A.Ryzhenkov, S.I.Pogorelov,M.V.Lukin // BI. 2008. No 12.
- *Patent. 2323391 (RF)* A method of exploitation of the heat supply systems / V.A.Ryzhenков, S.I.Pogorelov, M.V.Lukin, A.V.Kurshakov, A.P.Voloshenko // BI. 2008. No 12.

Dissertations

- *Mednikov A.F.* Movement of the inter-phase surfaces of He-II — vapor in the capillaries and at boiling on the spherical heaters: Cand. Sci. (Techn.) Dissertation. 2008.
- *Anahov I.P.* Increase of operation efficiency of the water-recycling systems of the TPP based on a removal and a prevention of formation the thermo-barrier deposits on the condenser pipe surfaces: Cand. Sci. (Techn.) Dissertation. 2008.
- *Lukin M.V* Increase of operation efficiency of the heat supply systems based on the heat exchange surfaces modification with the use of the surface-active substances: Cand. Sci. (Techn.) Dissertation. 2008.
- *Ryzhenkov A.V.* Research of the surface-active substances influence on a hydraulic resistance of the pipelines of the heat supply systems and the development of a method of the power inputs decrease at the heat-carrier transportation: Cand. Sci. (Techn.) Dissertation. 2008.
- *Tchernyshev S.A.* Increase of the operational qualities of the centrifugal pumps based on the change of the hydrodynamic interaction of a working stream with elements of a flowing part: Cand. Sci. (Techn.) Dissertation. 2008.

Partners

- Energy expert association of western Ural, Perm
- «NPO Gidromash» company, Moscow
- Department of science and industrial policy of Moscow
- Department of fuel-energy economy of Moscow Government
- Baikov Institute of metallurgy and metal sciences of RAS, Moscow
- Open Society «Second generating company of the wholesale market of the electric power» (Open Society«ОГК-2»), Troitsk
- «Leningradskiy metallicheskiy zavod» company, Sankt-Peterburg
- «Moscow Committee of science and technology» company
- «Mosenergo» company, Moscow
- Moscow JSC «MOEK»
- «Silovye mashiny» company, Moscow
- Open Society «the Southern generating company — TGK-8», Astrakhan
- All-Rusaia R&D Institute of nuclear power plants, Moscow
- Ministry of science and education of Russian Federation, Moscow
- Ministry of housing and communal services of Moscow region government
- Noncommercial partnership «Innovations in electric power industry» (NP «INVEL»), Moscow
- NPO «TSNIITMASH», Moscow
- FGUP «Keldysh R&D center», Moscow
- Russian association of pumping manufacturers, Moscow
- «POMPA» company, Schiolkovo
- Joint-Stock Company NPVP "Turbocon", Kaluga
- «SIGMA» company, Lutin, Czekhia
- FGUP «Karpov R&D physical-chemical institute», Moscow
- «ENA» company, Schiolkovo
- Federal Agency on science and innovations, Moscow

Unique equipment

- Ion-plasma vacuum installation with the planar unbalanced double-cathode magnetron system and the arc evaporator for the protective covering formation, an equipment for preparation and cleaning of the protected surfaces
- Setup for the nano-composite covering formation
- Setup for the erosion resistance determination for the constructive materials and the protective
- covering at the drop-shock influence in accordance with the functionality estimation order for the steam turbine operating blades during the manufacture, exploitation and repair
- Complete equipment for the corrosion research and testing fulfillment
- Mobile setup for an elimination and a deposit formation prediction with the concurrent
- protection against the corrosion of tubes and the thermal power engineering equipment
- Microscopes: optical inverted with a micro-hard measuring adapter, a scanning balloon-borne, a transmission, a focused beam
- Complex of the equipment for the metallo-graphic analysis produced by Buehler GmbH (USA)
- Tribometre of CSM Instruments SA for a wear resistance and a friction coefficient research
- Mechanical profilometer Dektak 150, intended for the profile registration, topography of a surface, a roughness definition in the sub-nano-metre range

MPEI SCIENCE-PARK

Ph/fax: (495) 362-7415, (495) 673-7088,
E-mail: info@sprk.ru,
Internet site: www.sprk.ru
Head of Science Department
MPEI Science Park
Alexander V. KOVAL'

Main lines of research

Research Supervisor

- **Development of the scientific potential of higher school**
  Professor Rogaliov N.D.
- **Development of the methods for estimation of the intellectual property objects**
  Head of Lab Solomatova M.V.
- **Account of the energy resources and energy saving (in the limits of housing and communal service reformation)**
  Head of Dept. Koval' A.V.

Agreements, contracts, projects supported by the state budget

- Development of algorithm for choosing the method of intellectual property object estimation created in the technical university in the limits of the analytical target program "Development of scientific potential of higher school" (2006-2008)
- Development of the technical-economic substantiation for creation an innovation company cluster in South-East administrative region
- Development of the technical-economic substantiation for "Creation the regional innovation-technology center of South-East administrative region of Moscow as the support infrastructure for high-tech company cluster

Key publications

- *Rogaliov, N.D.; Zubkova, A.G.; Negomedzianova, E.A.* Investment activity as an instrument for generating company cost management (in Russian) // Innovations. 2007. No 7(105). P. 107—111.
- *Rogaliov, N.D.; Zubkova, A.G.; Frei, D.A.* TPP industrial program planning under conditions of competitive relations development of thew energy market (in Russian) // Ibidem. No 1. P. 77—81.
- *Rogaliov, N.D.; Arutiunian, A.A.* Classification of risks and risk-formation factors for the generation companies (in Russian) // MPEI Vestnik. 2007. No 4. P. 113.
- *Koval', A.V.; Vasina; E.M.; Gasho, E.G.* Energy service company role in implementation of the energy saving complex programs in housing and communal service of Russian towns (in Russian) // Energy saving. 2007. No 6.
- *Rogaliov, N.D.; Solomatova, M.V.* Cluster structure investigations in the field of innovation activity (in Russian) // Radio electronics, electrical and power engineering: Proc. of XIII Intern. Conf. of graduate and PhD students. Moscow. MPEI Publishing House. 2007. P. 547—549.
- *Solomatova, M.V.* Approach to R&D result selection in the texhnical university for further commercialization (in Russian) // Proc. of Intern. Conf. «Inovatica-2007»: Ul'yanovsk, 2007. P. 91—93.
- *Koval', A.V.; Vasina; E.M.; Gasho, E.G.* Energy service company role in implementation of the energy saving complex programs in housing and communal service of Russian towns (in Russian) // Energy saving. 2007. No 6.

Partners

- Association «Tekhnopark», Moscow
- Innovation-technological centers union, Moscow
- Institute of innovations, creativity and capital, University of Texas at Austin, USA
- «BADA» corporation at Harbin polytechnic Institute, China
- Research-methodic center on innovation activity, Twer University, Twer
- Science-Park at Warwik University, UK
- Assistance foundation for small forms of enterprise in research-technological sphere, Moscow
- Assistance foundation for innovation activity in higher education institutions, Moscow
- Russian-Chinese Technopark "Friendship"
- JSC ESKoTEK
- JSC inTESco

Unique equipment

- Education program «Technology commercialization» created on the basis on module principle including large text material, educational video movies

INNOVATION-TECHNOLOGICAL CENTER (ITC)

Center Director

Director Dr. Sci. (Techn.), Professor
Nikolay D. ROGALEV
Ph.: (495) 362-7088, (495) 673-0287
Fax: (495) 362-7415
E-mail: spark@sp.mpei.ac.ru
Internet site: www.sprk.ru
Divisions of Innovation-Technological Center of MPEI

Institute Departments

- **«UVK SAYANY» Co**
- **«NPK MEDIANA-FILTER» Co**
- **«MERA» Co**
- **«NEIROCOM» Co**
- **«ENTEK» Co**
- **«ESKOTEK» Co**
- **«NPP TSIKL-PLUS» Co**
- **«INTRON PLUS» Co**
- **Russian-Chinese Technopark**
- **«FREINDSHIP»**
- **«ENERGOCONTROL» Co**

«IVK-SAYANY» CO.

Ph.: (495) 362-7002, (495) 362-7299,
ph/fax: (495) 918-0960, (495) 918-0500,
E-mail: root@sayany.ru
General Director
Igor V. KUZNIK

Main directions of activity

- **Development and implementation of the electronic units for the heat-counters (heat-calculators)**
- **Development and manufacture of the primary transducers for water, gas, oil-products consumption**
- **Manufacture of the temperature transducers of a resistive type**
- **Design, manufacture, attestation execution of the spill verifying setups**
- **Software development for the heat and heat-carrier registration automation**
- **Manufacture of the housing heat-counters and the water counters**
- **Creation of the normative documents**

«NPK MEDIANA-FILTER» CO.

Ph.: (495) 234-1660,
(495) 362-7475,
(495) 362-7825,
fax: (495) 234-19-77,
E-mail: info@mediana-filter.ru,
Internet site: http://mediana-filter.ru

At NPK Madiana-Filter Co.:
2 Doctors of sciences,
11 Ph.D.

General Director
Dr. Sci. (Phys.-Math.) Alexei A. PANTELEEV

Main Lines of Research

- **Development of the modern complex systems of a water treatment for medicine, pharmaceutics, energetic, microelectronics**
- **Development of the ecologically pure technologies of a water treatment for the industrial thermal energetic**

ITC «MERA» CO.

Ph.: (495) 362-7308,
(495) 362-7042,
fax: (495) 362-7732,
E-mail: info@mera-device.ru,
Internet site: www.mera-device.ru
General Director
Ph.D. (Techn.)
Sergey S. GROKHOVSKIY

Main Lines of Research

- **Research of the dynamic characteristics of the vibro-frequency force sensors on the basis of the crystal piezo resonators**
- **Methods and facilities for the metrological parameter testing of the force-sensitive piezo resonators**
- **Development of an automated system for the constructive parameter modeling and calculations for the force sensor elastic elements**
- **Development of the adaptive control algorithms in the measuring systems using the piezo-crystal sensors**

«NEIROKOM» CO.

Ph.: (495) 362-7907,
(495) 362-7591,
(495) 362-7853,
fax: (495) 362-7143
E-mail: info@neurocom.ru

At «Neirokom» Co.:
3 Dr. Sci. (Phys.Math.),
8 Ph.D.

General Director,
Ph.D. (Med.) Viacheslav M. SHAKHNAROVICH

Main lines of research

- Development, manufacture preparation and manufacture:
- equipment for a radio telemetry of special and general purposes;
- safety devices and systems for a railway transport;
- specific sensors and the special power sources;
- technical facilities for the noninvasive medical and psycho-physiological diagnostics;
- Special software;
- Person-operator physiological condition monitoring systems and its condition control with the help of his operation maximal effectiveness achieving;
- special device families with the biological feedback for training in a self-regulation and a treatment.
- Company has its own premises and the qualified radio engineers, adjusters, assembling metalworkers, has a modern technological equipment. The most part of equipment developed by company is manufactured in its own workshops or on the basis of co-operation with the defense conversion enterprises. The manufacture is licensed. All products are certified. The branching acceptance of the products is organized in the company

«ENTEK» CO.

Ph.: (495) 673-0304,
fax: (495) 362-7370,
E-mail: main@entek.ru,
Internet site: www.entek.ru
General Director
Ph.D. (Techn.)
Alexander B. KOZHIN

Main lines of activity

- R&D execution for development of the high-tech and resource-saving technologies in the area of an energetic. R&D are fulfilled on the basis of the Steam and Gas Turbines Department laboratories of the Moscow Power Engineering Institute
- Development, modernization, manufacture and delivery to the thermal power plants of the deport units to an energetic equipment
- Constructing-and-mounting operation fulfillment; the outward and inward engineering net and the equipment mounting; mounting of the heat-power equipment, compressors, pumps and fans, gas cleaning equipment, technological metal constructions; start-adjusting operations for the heat-power equipment, refrigerating and compressor installations, water supply, sewerage and the heat supply systems; vibro-diagnostics of the TPP equipment
- Development of a software for PC

«ESKOTEK» CO.

Ph.: (495) 362-7233,
fax: (495) 362-7994,
E-mail: eskotech@sp.mpei.ac.ru,
Internet site: www.sprk.ru

At «ESKoTek» Co.:
50 employees

General Director
Alexander V. KOVAL'

Main lines of activity

- Design, assembling, adjustment of the heat and hot-water supply registration units «turnkey», guaranteed and after-guarantee service
- Mounting, adjustment and repair of the energy objects, the electrical and the thermal power engineering equipment
- Inspection of a particular condition of he heat-supply and heat-consumption in the region, recommendations development on a choice of the promising directions of heat-savings, heat-saving project execution
- Energy consulting and audit

«TSYKL PLUS» CO.

Ph.: (495) 362-7996, (495) 362-7576,
E-mail: ovn@aep.mpei.ac.ru

At «TSIKL PLUS» Co.:
11 employees

General Director, Scientific Supervisor
Dr. Sci. (Techn.), Associated-Professor
Vadim N. OSTRIROV

Main lines of activity

- **Development of an electronic converter family for the electric drives and the power sources on the modern element base**
- **Development and investigations of the regulated asynchronous, gated and gated-inductor electric drives**
- **Experimental development, manufacture, guarantee and after-guarantee service of the electronic converters for the regulated asynchronous, gated and gated-inductor electric drives of the different purposes**

Agreements, contracts, projects supported by the state budget

- About 20 contracts on development, experimental development, manufacture and delivery of the electronic converters including for energetic, housing and communal services, the special systems, a transport including the export contracts

Unique equipment

- Automatic regulators for the dosing pumps ARDN-3
- Electronic converters for the gated-inductor electric drives up to 32,5 kW power with different number of phases (from 2 to 6)
- Energy saving complete equipment for the hot water supply pumps and for waste waters exhaustion pumps up to 400 kW power
- Regulated electric drive which has no analogues in the world up to 630 kW in power on the basis of a gated-inductor motor with an independent excitation
- Secondary supply sources from the contact net 6 and 10 kW in power for the modern subway cars
- Voltage regulators BRN for the secondary power supply sources of the passenger and rail-way cars with power up to 32 kW

Key Publications

- Dem'yanenko, A.V.; Zherdev, I.A.; Kozachenko, V.F.; Rusakov, A.M. Non-contact inductor gated electrical machine with an electromagnetic excitation. Patent 2277284 (RU 2277284 C2). МПК H02K 19/10, H02K 29/00. BI No 15. 2006.
- Korpusov, D.E.; Kozachenko, V.F.; Rusakov, A.M. Gated-inductor electrical drive. Patent 53515 (RU 53515 U1). МПК H02M 5/40. BI No13. 2006.
- Ostrirov, V.N.; Dmitriev, V.Yu. Development and implementation of the native electronic converter devices for the regulated electrical drives and for the strong power sources. Privodnaya tekhnika, No 4, 2008.
- Ostrirov, V.N.; Mil'skiy; K.V. Reasonable circuits of the frequency converters for the powerful synchronous gated-electrical drives. Electronic components, No 11, 2008.

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Ph.: (495) 229-3747,
fax: (495) 510-1769,
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- **Development and manufacture of the DC system components for the electric stations and sub-stations**
- **Development and manufacture of the powerful voltage regulators, voltage regulators for the electrical lighting systems**