INSTITUTE OF POWER MACHINERY AND MECHANICS (IPMM)

Director of the Institute

Pavel V. ROSLYAKOV
Dr. Sci. (Tech.), Prof.
Member of the International Higher Education Academy of Sciences

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Departments of the Institute

IPM DEPARTMENT OF STEAM GENERATOR DESIGN (SGD)

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The department has on its staff
10 lecturers
2 researchers
2 Ph.D. students

Head of Department
Dr. Sci. (Techn), Professor Vladimir A. DVOINISHNIKOV

Main Lines of Research

Research supervisors

- **Development of mathematical models and software support for evaluation, substantiation and making technical decisions in steam boiler design.**
  Prof. V. A. Dvoinishnikov
- **Development of computer-aided expertise-diagnostic systems for steam boilers and boiler elements.**
  Prof. V. A. Dvoinishnikov
- **Mathematical modeling of NOx, SOx and PAH formation in power engineering units burning fossil fuels.**
  Prof. P.V. Roslyakov
- **Development and implementation of highly efficient and environmentally friendly technologies for firing fossil fuels.**
  Prof. P.V. Roslyakov, Sr. Researcher V.A. Molchanov
- **Development of computer-aided technologies for designing power production facilities.**
  Prof. M.A. Izumov, Assoc. Prof. V.P. Kniazkov
- **Development and implementation of continuous monitoring and control systems for reduction of harmful pollutants emitted from a thermal power plant into the environment.**
  Prof. P.V. Roslyakov
- **Improvement of the reliability and efficiency of steam boilers in a thermal power plant.**
  Prof. V. A. Dvoinishnikov, Sr. Researcher V.A. Molchanov

Agreements, Contracts, Projects Supported by State Budget

- Development of mathematical modeling methods for heat-and-mass transfer processes at burning organic fuels
- Developing and grounding major technical decisions and operating conditions for the improvement of the Ryazanskaya Power Plant's efficiency.
- Am approach and software development for predicting NOx emissions from stationary steam and hot water boilers fired with different fuels.
- Development of guidelines on monitoring the flue gas analysis sampled from steam and hot water boilers.
- Complex R & D work on grounding and expertise of major technical and design approaches in the development of furnaces for a series of unified boilers firing oil/gas fuel.
- Development and study of functional algorithms for the data acquisition system to be used in the continuous monitoring of harmful emissions from the Kazanskaya Heat-and-Power Plant-3.

- Development of the continuous monitoring type system for controlling the gaseous emissions from the heat-and-power plant into the atmospheric environment.
- Complex R & D work on grounding and expertise of major technical and design approaches in the development of the waste scheme of interface with combined turbine units the unified steam boilers 50, 75, 100 and 160 tons/hour of average pressure
- Developing and grounding major technical decisions of the organization a flue gas analysis and controlling the gaseous emissions into the atmospheric environment.
- Testing and investigating the operating modes of steam boilers of the Dyagilevskaya Heat-and-Power Plant.
- Substantiation of technical decisions on decrease ecological influences of 800 MW units on an environment and increase of boilers reliability at burning gas, black oil and their mixtures
- Introduction of electronic regime cards of steam boilers of the Dyagilevskaya Heat-and-Power Plant.
- Developing of the efficient new technical decisions for fuel burning aimed the NOx emissions decrease
- Analytical researches of working processes for a series of unified coal steam boilers 75, 120, 150, 220, 270 and 320 tons/hour of average and high pressure

Key publications

- Roslyakov P.V., Egorova L.E., Zakirov I.A., Ionkin I.L. Organization of the gas structure inspection for combustion products of stationary steam and water-heating boilers. Methodical instructions (in Russian). ORGRES Publisher, 2003.32 p.
- Roslyakov P.V. Problems of the Rassian fuel and energy complex (in Russian). Vestnik MEI. 2003. № 5 pp.20-26
- Dvoinishnikov V.A. Computer technologies application for designing and diagnostics of steam boilers and heat-recovery steam generators of combined cycle units (in Russian). Vestnik MEI. 2003. № 5 pp.27-34
- The substantiation and a choice of the basic design decisions on boiler E-160-3,9-440 for GES-1 MOSENERGO (in Russian). Dvoinishnikov V.A., Izumov M.A., Soupranov V.M., et al. Teploenergetika. 2003. № 12 , pp. 26-32.
- Roslyakov P.V., Egorova L.E., Ionkin I.L., Privezentzev D.V. Research of stage combustion of natural gas and black oil (in Russian). Vestnik MEI. 2001. №3. pp. 5-13.
- Functioning principles of information-measuring complex for emissions monitoring and control at heat power plant (in Russian). Roslyakov P.V., Zakirov I.A., Ionkin I.L. et al. *Proc. of the Intern. Conf. on Information Aids and Technologies*. Moscow: «YANUS-K» Publisher, 2002, pp.46–49.
- Functioning principles of information-measuring complex for emissions monitoring and control at heat power plant (in Russian). Roslyakov P.V., Y.E., Ionkin I.L., Zakirov I.A. et al. *Proc. of the Intern. Conf. on Information Aids and Technologies*. YANUS-K Publisher, 2003, pp.8–11.
- Roslyakov P.V., Ionkin I.L., Zakirov I.A., Morokhovets Yu.E. Development of functioning algorithms continuous emissions monitoring and regulating system for heat power plants (in Russian). Ibid, pp.12–15.
- Roslyakov P.V., Ionkin I.L., Zakirov I.A., Egorova L.A. Definition of non-uniformity of speed and concentration fields along height of a stack at heat power plant (in Russian). Ibid, pp.7–10.
- Dvoinishnikov V.A., Knyazkov V.P., Galkov V.A. Heat transfer modeling in convection heating surfaces with corridor arranged spiral fin tubes (in Russian). Ibid, 2004, pp.11–15.

- Dvoinishnikov V.A., Knyazkov V.P., Galkov V.A. Research of aerodynamic resistance influence to flow characteristics in 90° reversed gas-duct (in Russian). Ibid, pp.16–19.
- Dvoinishnikov V.A., Knyazkov V.P., Chubenko T.S., Galkov V.A. Research of of heat transfer influence to economizer thermal perception of steam boiler E-160-3.9-440 GM (P-95) GES-1 MOSENERGO (in Russian). Ibid, pp.20–24.
- Dvoinishnikov V.A., Popov E.A. Dynamic characteristics of heat recovery boiler P-88 PGU-325 (in Russian). Ibid, pp.31–36.
- Kniazkov V.P., Popov E.A. Features of aerodynamics and heat transfer in superdense pipe beams (in Rusian). Ibid, pp.37–41.

Partners

- AO «Machine-Building Factory ZiO-Podolsk», Podolsk, Moscow Region.
- AO «Engineering Co. ZiOMAR», Podolsk, Moscow Region.
- AO «SIBENERGOMASH» (BKZ), Barnaul.
- Belgorodskiy Power Machinery Manufacturer (BZEM), Belgorod.
- AO «TEPLOENERGOPROEKT Institute» (TEP), Moscow.
- AO «All-Russian Thermal Engineering Institute» (VT I), Moscow.
- Special Design Bureau (OKB VT I), Moscow.
- AO «Central Design Bureau ENERGOREMONT», Moscow.
- RAO «EES Rossii», Moscow.
- AO «MOSENERGO», Moscow.
- AO «RYAZANENERGO», Ryazan.
- AO «TYUMENENERGO», Sourgut, Tyumen Region.
- PEO «TATENERGO», Kazan.

IPM DEPARTMENT OF STEAM AND GAS TURBINES (SGTD)

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The department has on its staff:
18 lecturers,
16 researchers ,
15 Ph.D. students.
Head of Departement
Vladimir G. GRIBIN
Dr. Sci. (Techn), Prof.

Main Lines of Research.

Research supervisors

- **Development and optimization of steam-turbine installations of the new generation for supercritical steam conditions and of new efficient power units for retrofitting power engineering equipment at Russian thermal power stations**
  Prof. B.M. Troyanovskii, Prof. A.G. Kostyuk, Prof. V.G. Gribin
- **Development of calculation methods and research of combine cycle installations of heat-recovery type**
  Prof. A.D. Trukhnii, Prof. V.G. Gribin, Prof. T.V. Bogomolova
- **Aerodynamics improvement of the components in the turbine flow path including blades elements, steam admission system; inlet, outlet, and transition pieces, and seals for steam and gas turbines designed for different applications**
  Prof. A.E. Zaryankin, Prof. V.G. Gribin
- **Vibrating diagnostics of steam inlet systems of steam turbines**
  Assoc. Prof. V.F. Kasilov
- **Perfection of operation quality of the heat exchange equipment at thermal and nuclear power plants**
  Prof. A.D. Trukhnii
- **Resource prolongation and reliability increase of steam turbines**
  Prof. A.D. Trukhnii, Prof. A.G. Kostyuk
- **Computer modeling of current in a flowing part of low pressure cylinder of powerful steam turbines**
  Prof. T.V. Bogomolova
- **Development and improvement of new control systems and upgrading of existing automatic control systems of steam-turbine and gas-turbine units**
  Prof. A.E. Bulkin

Agreements, Contracts, Projects Supported by State Budget

- Development of hardware and software for vibrating diagnostics of turbine steam inlet systems
- Improving the efficiency and the reliability of different turbomachinery types
- Development of methods for raising the thermal and the electric capacity and an efficiency of steam turbines for co-generation power plants in Russia
- Reliability analysis of the last stage buckets operation in a LP cylinder at small volumetric flow-rates and an elevated pressure in the condenser
- Elaboration of methods for evaluating the residual service life of turbines components at thermal and co-generation power stations in Russia
- Expertise of steam-turbine, gas-turbine, and combined-cycle installations projects

- Development and investigation of new exhaust hoods and modernization of existing exhaust hoods of large steam turbines
- Development of new control and lock valves and modernization of existing valves for steam turbines of various application
- Designing components of steam-turbine and gas-turbine units integrated in a combined-cycle unit with heat recovery key
- Account of flow in channel of last steps of low pressure cylinders of powerful steam turbines with the real losses

The basic publications

- Trukhnii A.D., Korzh D.D., Lebedeva A.I. Generalization of the fatigue characteristics of P2MA rotor steel for use in system of technical diagnostics of turbines service life (in Russian). Teploenergetika. 2003. № 6. P. 16-21.
- Ametistov E.V., Voronov V.N., Trukhnii A.D. Thermal power engineering systems and Teploenergetika journal (in Russian). Teploenergetika. 2004. № 1. P. 7-8.
- Zagretdinov I.Sh., Trukhnii A.D., Kostyuk A.G., Dorlzhanskii P.R. Destruction of 300 MW steam turbine in Kashira Power Station: the reasons, consequences, conclusions (in Russian). Teploenergetika. 2004. № 5. P. 5-15.
- Kostyuk A.G., Trukhnii A.D., Lomakin B.V. About transfer conditions of the steam turbine T-250/300-23,5 in operation mode without working blades of last step (in Russian). Teploenergetika. 2004. № 5. P. 23-30.
- Kostyuk A.G., Trukhnii A.D. Long durability of solid-forged rotors of steam turbines with power of 200, 300 and 800 MW manufactures by LMP at prolonged statical loading (in Russian). Teploenergetika. 2004. № 10. P. 45-52.
- Kasilov V.F., Sharkov A.V. Estimation of water steam humidity influence pair on efficiency of outlet branch pipes low pressure part of steam turbines (in Russian). Teploenergetika. 2004. № 5. P. 36-41.
- Zaryankin A.E., Zaryankin V.A., Simonov B.P. Some opportunities of efficiency increase of steam turbines flowing parts (in Russian). Teploenergetika. 2003. № 6. P. 6-11.
- Zaryankin A.E., Rossikhin S.Yu., Fisher E.R., Shalkhub T. Research of currents in up-area of steam turbines last steps (in Russian). Tiazholoe mashinostroenie. 2004. №7. P. 12-16.
- Zaryankin A.E. and other. Antivortical lattices application in exhaust branch pipes of steam turbines (in Russian). // Zaryankin A.E., Simonov B.P., Paramonov A.N. et al. Tiazholoe mashinostroenie. 2003. №7. P. 2-6.
- Gribin V.G., Senin D.V. Account of the ring diffuser characteristics for an exhaust branch pipe of gas-turbine installation (in Russian). Proc. of the Intern. Conf. «Information means and technologies». Yanus-K Publisher, 2004. Vol.1. P. 46-48.
- Gribin V.G., Chernoshtan V.I. Influence of flowing part sizes on the characteristics of the regulating valve (in Russian). Armatura. 2004. № 6. P. 10-15.

Dissertations

- Korotkov V.V. Research and development of lock-regulating valves with high reliability and low aerodynamic resistance. Cand. Sci. (Tech) Dissertation. 2003.
- Agapov R.V. Experimental researches of liquid films formation in elements of turbine steps. Cand. Sci. (Tech) Dissertation. 2003
- Rossikhin S.U. Research and development of the punched screens and their influence on reliability and profitability of last steps of low pressure cylinders of steam turbines. Cand. Sci. (Tech) Dissertation. 2003

- Konovalov R.N. Experimental researches of throttling and dynamic compacting characteristics for a step with complete and partial steam inlet. Cand. Sci. (Tech) Dissertation. 2004

The partners

- Leningrad Metal Works (AO LMZ), Saint-Petersburg
- Firm "«Scoda", Czechia
- RAO EES of Russia, Moscow
- JSC "Mosenergo", Moscow

Unique Equipment

- Unique experimental steam and air turbines having no the world's analogues
- Experimental centrifugal compressors driven by steam turbines and electric motors
- Experimental facilities for investigation of a flow in elements of turbine path, rotating and fixed blade cascades, control valves, and exhaust hoods
- Experimental facilities for studying the static strength of turbine components under different loading conditions
- Experimental facilities for investigation of the turbines vibration reliability
- Special measurement systems, which are provided for all the experimental
- Facilities of the Department, and unique automatic experiment control systems having no the world's analogues.

IPM DEPARTMENT OF HYDROMECHANICS AND HYDRAULIC MACHINES

Phone: (095) 362-7117, Fax: (095) 362-8938, e-mail: ggm@ggm.mpei.ac.ru

The department has on its staff:
19 teachers
2 researchers
4 Ph.D. students

Head of the Department
Ph.D, Ass. Prof.
Gribkov Alexander M. GRIBKOV

■ Main fields of research

Research supervisors)

- **Fundamental investigations in the field of theoretical fluid and gas dynamics and development ща gas and fluid flow description methods of improved adequacy to the real processes.**
  Prof. Morgunov G.M.
- **Flow hydrodynamics in thin layers of viscous fluid.**
  Prof. Yemtsev B.T.
- **Developing of new types of electrohydraulic transmission and their elements for various applications.**
  Prof. Golubev V.I.
- **Development of hydropower installations of increased efficiency and reliability.**
  Prof. Morgunov G.M., Ass. Prof. Orachelashvili B.M.
- **Theoretical analysis, investigations and developing of autonomous electrohydraulic drives.**
  Assoc. Prof. Zuev Y.Y.
- **Investigation of physical effects and designing of hermetic electric pumps of non-conventional energy conversion.**
  Assoc. Prof. Zuev Y.Y.
- **Characteristics investigation and development of automatic logical elements based on jet technique.**
  Assoc. Prof. Davydov A.I.
- **Development of highly reliable flow meters for fire-and-explosion hazardous media.**
  Assoc. Prof. Zyubin I.A.
- **Studying the effect of pump and hydraulic system elements operation on reliability of Heat Power Plant main technological cycles functioning.**
  Assoc. Prof. Pankratov S.N.

■ Contracts and state financed topics.

- Theoretical fundamentals for parametric synthesis methods in design of highly efficient equipment.
- Design of automated hydraulic turbine aggregate with power up to 100 kW
- Development of calculation method for main parameters of hydraulic distributors with flat valves.
- Soft wear development for «Complex for design and investigations of hydro- and pneumatic drives and control systems based on them».
- Design, investigations and control problems of hydraulic transmissions for wind power units.
- Parametric – structural synthesis of wind power installations with complex hydraulic drive.

Main publications.

- Morgunov G.M. Mathematical model of 3-D hydrodynamic reverse problem solution for vane systems of turbomachines (in Russian). Vestnik MEI. 2003, № 2, pp. 10-14
- Morgunov G.M. Symmetrical hydro power stations and flow channels of hydraulic turbines (in Russian). Vestnik MEI. 2003, № 3, pp. 11-19
- Morgunov G.M. Comparison of computer simulation of hydro-gas dynamic processes with flow description in hydraulic machines (in Russian). Proc. of the Intern. Conf. «State of the art and perspectives of hydromachines manufacturing in XXI century», St.-P., Nektor Publisher, 2003, pp. 6-11
- Morgunov G.M. Increased effectiveness of flow media implementation (in Russian). Ibid. pp. 11-15
- Golubev V.I., Zyubin Y.Y. Structures synthesis principles of a hydraulic transmission for wind energy installations (in Russian). Ibid. P. 297-300.
- Zuev Y.Y. Regulated hermetic submerged aggregate for CH raw materials transportation (in Russian). Nauka i tekhnika na rechnom transporte, 2003, № 2, pp. 37-39
- Golubev V.I., Yemtsev B.T., Zuev Y.Y., Morgunov G.M. Scientific-pedagogical school of department of hydromechanics and hydromachines department (in Russian). Vestnik MEI. 2003, № 5, pp. 35-39
- Orachelashvili B.M., Markin V.N. Hydroturbine equipment of small HPES (in Russian). Gidrotekhnicheskoe stroitel'stvo. 2003, № 9, pp. 8-14
- Zyubin I.A., Pankratov S.N. Application of speed regulated centrifugal pumps at pump stations (in Russian). Energosluzhba predpriyatii. 2003, № 1. P. 21-24.
- Soljar S.V., Golubev V.I., Volkov S.V. Improvement of hydraulic distributor with flat valve (in Russian). Vestnik MEI. 2003, № 6, pp. 144-148
- Pankratov S.N. Improvement of reliability and efficiency at vane pump operation (in Russian). Energosluzhba predpriyatii. 2003, № 4, pp. 19-23
- Golubev V.I., Cherkasskih S.N. Soft ware for wind power installation modelling (in Russian). Proc. of the Intern. Conf. «Information means and technologies». Yanus-K Publisher. 2004, vol.1, pp. 42-45
- Orachelashvili B.M., Fotkin S.B., Livinski A.P. State of the art and perspectives of power equipment development for small HPES (in Russian). Gornyi zhurnal. 2004, Special issue, pp. 100-102

Patents

- Patent No. 2232289 RF. Hydropower station. G.M. Morgunov. BI 2004. No. 19.
- Patent No. 34218 RF. Hydroamplifier. V.I. Golubev, I.A. Zyubin, S.V. Soliar. BI 2003. No. 33.
- Patent No. 34219 RF. Hydroamplifier. V.I. Golubev, I.A. Zyubin, S.V. Soliar. BI 2003. No. 33.
- Patent No. 32125 RF. Wind energy installation. V.I. Golubev, I.A. Zyubin. BI 2004. No. 6.
- Patent No. 38851 RF. Hydro piston pump of reciprocal motion with double action. Yu.A. Petrov, P.I. Shpak, V.I. Golubev, P.V. Popov. BI 2004. No. 19.
- Patent No. 42862 RF. Wind energy installation. V.I. Golubev, I.A. Zyubin. BI 2004. No. 35.

Dissertations

- Pochernina N. I. Numerical simulation of turbulence at specific flow regimes in hydraulic and pneumatic machine channels. Cand. Sci. (Techn) Dissertation, 2003

Partners

- Central research institute of automatics and hydraulics, Moscow
- SPO «Gidromash», Moscow
- RSPO «Rosuchpribor», Moscow
- OAS RAO «UES of Russia», Moscow
- OAS «Mosenergo», Moscow
- «Sigma» (Czechia)
- «Festo» (Germany)
- «Firma MAGI» Ltd, Moscow
- «Grundfos» (Denmark)

The unique equipment

- The efficiency and cavitation test stands for investigation of hydraulics turbines, reversible hydromachines and high specific speed pump.
- The test bench for power and dynamic studies of hydraulics drive systems and control devices for high pressure positive-displacement-rotary pumps.
- The test bench for examining liquid flow meters and counters.
- The test bench for investigation of centrifugal pumps with speed variation.

IPM DEPARTMENT OF DYNAMICS AND STRENGTH OF MACHINERY

The department has on its staff
25 teachers
10 Ph.D. students

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

The basic directions of scientific researches

The scientific chiefs

- **Mechanics of Fracture and Fatigue**

  Academician V.V. Bolotin
- **Probabilistic Dynamics and Structural Safety of machines and constructions**

  Prof. V.P. Chirkov
- **Dynamics and Stability of Structures**

  Academician V.V. Bolotin

Agreements, Contracts, State Budget subjects

- Analysis of dynamic response of structures to strong seismic actions
- Stability and post-critical behavior of essentially deformed systems at non-conservative loading
- Damage and fracture of deformed solids in aggressive environment
- Development of methods for evaluation of the fracture safety and reliability factors for structures and machinery
- Assessment of reliability of gas pipelines construction and pressure vessels in extreme ambient conditions
- Dynamics of multi-body systems under impact and vibration

The main recent publications

- Proceedings of the International Conference «Reliability problems of machines and structures» (in Russian).*Ed. V.P. Chirkov*. Moscow: Sovremennye tetrady Publisher, 2003. 200 c.
- *Bolotin V.V., Trifonov O.V.* Assessment of safety and failure modes for structures under strong seismic and related actions. In: Computational Stochastic Mechanics. Millpress Rotterdam Netherlands, 2003. P. 67 – 73.
- *Bolotin V.V., Radin V.P., Chirkov V.P.* Investigation of behavior of structures taking into account stiffness degradation under seismic actions (in Russian). Izvestiya Vuzov. Stroitelstvo. 2003. № 7. P. 6-10.
- *Volokhovsky V.V., Vorontsov A.N., Sukhorukov V.V.* Valutazione della resistanza di funi metalliche. Technologie del Filo, XX (2002), 3, s. 94-99.
- *Petrovsky A.V.* Dynamical behavior of a double-link nonorthogonal pendulum under non-potential loading (in Russian). Izvestia RAN. Mekhanika Tverdogo Tela, 2003, №5 (English translation: Mechanics of Solids, 2003).

Dissertations

- *Trifonov O.V.* Nonlinear behavior and risk assessment of structures under strong dynamical actions. Dr. Sci. (Techn) Dissertation, 2004.
- *Novikova O.V.* Application of statistical modeling for assessment of seismic risk of structures. Cand. Sci. (Techn) Dissertation, 2004

- *Zhuravliov D.V.* Application of advanced methods for strength estimation and residual service life of equipment for gas transportation. Cand. Sci. (Techn) Dissertation, 2004

Partners

- Russian Found of basic research. Moscow.
- Russian Academy of Architecture and Structural Sciences. Moscow.
- Science of Machines Institute named after Academician Blagonravov A.A. Moscow.
- Russian State Business Concern on Production of Electric and Heat Energy (ROSENERGOATOM). Moscow.
- All-Russian Research Institute of Organic Chemistry named after Academician Bochvar A.A. Moscow.
- DAO Central Design Office of Oil Equipment. OAO GAZPROM. Podolsk.
- All-Russian Research Institute of Natural Gas and Gas Technologies. OAO GAZPROM. Moscow.
- Research and Design Institute of Power Technology. Moscow.
- OAO Chekhov Power Engineering Industry Plant. Chekhov.
- OOO «Eurosoft». Moscow.
- OOO «Intron-Plus». Moscow.

IPM DEPARTMENT OF THEORETICAL MECHANICS AND MECHATRONICS

The department has on its staff:
15 lecturers
1 researcher
9 Ph.D. students

Head of the Department
Dr.Sci. (Phys.-Math.), Professor
Alexander I. KOBRIN

Main Research Topics

Scientific Supervisors

- **Mechatronics control systems. Renewable energy sources.**
  Prof. A.I. Kobrin
- **The motion of mobile robots and non-holonomic electromechanical systems**
  Prof. Yu.G. Martynenko, Head of lab. I.V. Orlov
- **Mathematical Simulation and Analysis of Sensors Dynamics in Navigation and Motion Control Systems**
  Prof. Yu.G. Martynenko, Prof. V.V. Podalkov, Assoc. Prof. I.I. Merkur'ev
- **Stability theory. Inductive Method in Solving Problems on Mathematics and Mechanics**
  Prof. M.N. Kirsanov
- **Optimum Control and Estimation in Dynamic Systems**
  Assoc. Prof. I.I. Merkur'ev
- **Computer Simulation of Linked Bodies Systems. Computer Educational and Control Software.**
  Assoc.Prof. N.V. Osadchenko, Assoc. Prof. Koretskii A.V.
- **New Nano-mechanical Technologies for development diamond like silicon-carbon firms and coats**
  Head of lab. M.L. Shupegin

Contracts and State Budget Themes

- New models, methods and algorithms in problems of orientation and control of mobile robots
- Dynamics and movement control of mechatronics systems
- The incorporated educational scientific center of fundamental problems and preparations of highly skilled experts in the field of aircraft and astronautics
- Astro-Inertial navigating system of a spaceship
- A poblem of combining of inertial, satellite and austro-measuring navigation systems of a spaceship on the base of initial data
- The independent multi sensors mobile one-wheeled robot. Algorithms of orientation, navigation and control.
- Parameters Identification of controlled mobile robots
- Theoretical and experimental researches of controlled autorotation system of firm bodies

Key publications

- Martynenko Yu..G., Okhotsimskiy D.E. New tasks of dynamics and control of mobile wheel robots (in Russian). Uspekhi mekhaniki. Scientific – publishing center of mechanics at National committee on theoretical and applied mechanics of the Russian Academy of Science, 2003, vol.2, № 1, 44 p.

- Kobin A.I., Martynenko Yu.G., Lensky A.V. Stability and control of autonomous motion of gyrowheel. Mathematical simulation and experimental result // 35th International Symposium on robotics. Paris, March 23-26, 2004. p. 15-20.
- Merkuriev I. V., Podalkov V. V., Gubarenko S.I. Influence of gimbals' non-linearity on dynamic and accuracy of micro electro-mechanical gyro. 11th S.-Petersburg International conference on Integrated Navigation Systems, 2004. – S.-P, 2004. – P. 198 – 201.
- Merkuriev I.V., Podalkov V.V. Nonlinear effects in dynamics of a micromechanical gyroscope (in Russian). Vestnik MEI. 2004. № 2, p. 5-10.
- Martynenko Yu.G., Orlov I.V. Program control of the telescopic manipulator on a mobile platform (in Russian). Vestnik MEI. 2003. № 5. p. 60-70.
- Martynenko Yu..G. Application of the non-holonomic electromechanical systems theory to problems of dynamics of mobile wheel robots (in Russian). Collection of papers to 125 anniversary of Theoretical Mechanics Dept. Of Bauman University. Bauman MGTU Publisher, 2003, p. 33-47
- Kirsanov M.N. Accelerations and higher derivatives perturbations of linear dynamic process (in Russian). Proc. of the Intern. Conf. «Information means and Technologies» 14-16 Oct. 2003, Yanus-K Publisher. 2003, p. 76-82.
- Kobrin A.I., Chepel D.M. A problem of collisions modeling for robots – football players (in Russian). Ibid. p. 86-90.
- Pankratyeva G.V., Isaenko I.V. Dynamics of a wheel platform with a sail (in Russian). Ibid, p. 90-94
- Donnik A.S., Podalkov V.V. About a standing wave precession for oscillations of axisymmetric rotating jacket of varying thichkness (in Russian). Ibid. 3. 65-68.
- Cherenkova E.Y., Podalkov V.V. A control of manipulator elastic boom to the given position with account of transverse oscillations (in Russian). Ibid. P. 69-73.
- Vorob'iov V.A., Merkur'ev I.V. The micromechanical gyroscope drift evaluation caused by non-linear deformations of ring resonator (in Russian). Ibid. P. 73-76.
- Zhivov P.N. A theoretical model of the control law choice for the dynamic systems optimal identification (in Russian). Ibid. P. 77-80.
- Gavrilenko A.B., Merkur'ev I.V. Development of algorithmic and software for austro-navigational system of the spaceship (in Russian). Ibid. P. 84-87.

Dissertations

- Kuvykin V.I. Influence of magnetic friction on dynamics of a firm body in non-contact suspend. Cand. Sci. (Phys.Math) Dissertation. 2004.
- Orlov I.V. Movement control of the independent mobile telescopic manipulator. The Dissertation on competition of a scientific degree of Cand.Sci. (Techn) Dissertation. 2004.
- Gusev D.M. Mathematical bases and software for problems of navigation and control of independent wheel robots. Cand. Sci. (Phys.Math) Dissertation. 2003.
- Siregar H.P. Energy expenses at walking of antroph-amorphous robots. Cand. Sci. (Phys.Math) Dissertation. 2003.

Partners

- State Unitary Enterprise, «Moscow Experimental Design Office MARS», Moscow
- Keldysh Institute of applied mathematics of the Russian Academy of Science
- Institute of mechanics of the Lomonosov Moscow State University
- Moscow Electromechanics and Automatics Institute

- Federal Science – production Center «Ramenskoye Instrument – Engineering Design Bureau», Ramenskoye, Moscow region
- Federal Scientific Center «CSRI Electropibor», St. Petersburg
- Velizi Technological University, Paris, France
- Hydrodynamics Institute of the Tokhoku University, Japan
- Tsinghua University, China
- University of Enschede, Netherlands

Unique Equipment

- Equipment for spraying thin diamond like films
- Mobile robots for International scientific technical festivals «Mobile robots – 1999, 2000»
- Handle for displaying efforts during computer modeling (virtual reality)
- Computer package «Universal Mechanism» for modeling the dynamics of complex linked bodies
- Strap down Inertial Navigation System for investigating the regimes of initial alignment and navigation
- Installation for investigating dynamic and accuracy characteristics of a dynamically tuned gyroscope
- Installation for investigating the processes of information transmission and reception in multiprocessor and multitasks real-time systems

IPM DEPARTMENT OF METALS TECHNOLOGY

Ph.: (095) 362-7568, 362-7118, fax: (095) 362-8938
E-mail: techmet@mpei.ru

The department has on its staff
17 teachers,
2 researchers,
1 doctor's degree candidate,
7 Ph.D. students,

Head of Metals' Technology Department
Dr. Sci. (Techn), Professor
Vyacheslav M. MATYUNIN

The basic directions of scientific researches

The scientific chiefs

- **Development of metal's structural and mechanical state rapid assessment methods for industrial equipment**
  Prof. Matyunin V.M.
- **Creating of automated devices for non-destructive control of metal's physical and mechanical properties**
  Prof. Matyunin V.M.
- **Development the electron beam local processing technology, using for influence on the details' surface**
  Head of lab Khokhlovsky A.S.
- **Development the equipment and technology for bilateral simultaneous electron beam and arc welding**
  Assoc. Prof. Dragunov V.K.
- **Developmentthe complex of precision electron beam technologies for heterogeneous materials' welding**
  Assoc. Prof. Dragunov V.K.
- **Electron beam welding technologies of thin-walled details, making of refractory metals and alloys in poli- and monocrystal condition**
  Assoc. Prof. Novokreshchionov V.V.
- **Working out the precision technologies of diffusion welding for unique connections**
  Assoc. Prof. Novokreshchionov V.V.
- **Development the equipment and technology for automatic single-pass arc welding of thick metals**
  Assoc. Prof. Bushma V.O., Assoc. Prof. Borovik V.M.
- **Development and perfection of rolling technology and tool's calibration, using for production of hot-rolled pipes**
  Prof. Golubchik R.M.
- **Electron beam welding and processing control**
  Prof. Lastovirya V.N.

Agreements, contracts and State budget themes

- Researches of magnetic and mechanical characteristics of steel
- Researches of structural mechanical states of metal constructions
- Development of new technologies for manufacturing and restoration of welded combined constructions, making of heterogeneous alloys by means of electron beam
- Development and implementation of a method of simultaneous bilateral electron beam and arc welding of steels and alloys

- Development the methods and creation of portable devices for express control of metal's mechanical properties without details' destruction
- Development of precision technologies of assembling, welding and control for combined apertures of steam turbines
- Development of heat exchanger's electron beam welding technology and making of an experimental party of such details
- Investigations of regularities in the processes of arc welding for transport equipment details
- Modernization of industrial production for hot-rolled pipes, produced from alloyed steels.

Basic publications

- Matyunin V.M., Khokhlovsky A.S., Dragunov V.K. Developments of Metals' technology Department of MPEI (TU) in the field of high technologies and diagnostics of materials (in Russian). Vestnik MEI. 2003. N 5. P. 45—50.
- Matyunin V.M. Hardness Methods in materials diagnostics. Condition, problems, prospects (in Russian). Zavodskaya laboratoria. 2004. N 6. P. 37—42.
- Karimbekov M.A., Vigdorovich V.N. An example of a surface temperature measurement problem solution (in Russian). Vestnik MEI. 2003. N 2. P. 24—28.
- Dragunov V.K., Goncharov A.L., Vetrov N.A. Peculiarities of assembly and electron beam welding of combined diaphragms of steam turbines (in Russian). Sborka v mashinostrienii i priborostroenii. 2003. N 3. P. 9—16.
- Bushma V.O. Plate electrode's heating by means of a passing current of arc welding with stationary melting electrode (in Russian). Prikladnaya fisika. 2003. N 2. P. 41—46.
- Dragunov V.K. Effect of design features of welded joints on weld formation in electron beam welding dissimilar steels and alloys // Welding International, 2003. № 17(1) P. 61-66.

Dissertations

- Karimbekov M.A. Physical and technological bases of film thermoelectrical converters for measuring purposes. Dr. Sci. (Techn) Dissertation, 2003.
- Poruchikov A.V. The development of hardness testing methods and determination of mechanical properties of machine-building materials be means of indenter's pressing. Cand. Sci. (Techn) Dissertation, 2003.
- Chepurin M.V. Features of cyclic form changing at bar piercing in screw-rolling mills of different types in view of directing tools position in deformation zone. Cand. Sci. (Techn) Dissertation, 2004.

Partners

- Bauman Moscow State Technical University
- Joint-stock Company «NPO Energomash» (Khimki)
- Joint-stock Company «Fakel» (Khimki)
- High Technical School (Konstantz, Germany)
- Institute of electrical welding named by E.O. Paton (Kiev, Ukraine)
- Technical University (Budapest, Hungary)
- Physico-technical institute (Minsk, Republic Belarus)
- Institute of machines (Russian Academy of Sciences, Moscow)

- State Center of science «Research-and-production association on mechanical engineering technology» (Research-and-production «TSNIITMASH», Moscow)
- Joint-stock Company «Aeroelectric» (Moscow)

Unique equipment

- Electron beam plant «Langepen» for metals' welding (its electrical power is 45 kilowatt);
- Multipurpose testing machine «Instron» for mechanical tests of materials with program control;
- Stationary and portable devices for non-destructive rapid assessment of physico-mechanical properties of structural materials;
- Equipment for the automatic single-pass arc welding of thick metals
- Plant for diffusion welding «SVDU-26M»

IPM DEPARTMENT OF MACHINE DESIGN FUNDAMENTALS

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The department has on its staff
15 lecturers,
1 researcher

Head of Department:
Dmitry D. KORZH
Assoc. Prof., Cand. Sci. (Techn)

Main Lines of Research

Research supervisors

- **Designing of parts and assemblies for special purposes made from composite and traditional materials**
  Prof. V.P. Nikolaev
- **Study of the strength and the reliability of structural elements made from composite materials**
  Prof. V.P. Nikolaev
- **Designing of equipment for laboratories and research activities**
  Prof. V.P. Nikolaev
- **Development of resources evaluation methods for power engineering equipment elements under steady and variable operating conditions**
  Assoc. Prof. D. D. Korzh
- **Investigation of the electrical equipment operability under dynamic loading**
  Prof. E.P. Kudryavtsev
- **Development of equipment for chemical laboratories of universities**
  Assoc. Prof. S.F. Moroz
- **Development of approach for technical systems designing**
  Assos. Prof. A.N. Khoroshev
- **Development and creation of the scientific and methodical guidelines for training of machinery designers**
  Assos. Prof. A.N. Khoroshev

Agreements, Contracts, Projects Supported by State Budget

- Development of scientific approaches for operative systems of reliability estimations cration for the power plants equipment by results of monitoring
- Analysis and research of structural components for laboratory equipment on machines details and development of a methodological basis of their carrying out with application of computer technologies
- Development of complex equipment of a laboratory-class for the automated design at the course "Bases of designing"
- Development and approbation of adaptations for tests of ring and tubular samples from the reinforced composite material on the basis of a polymeric matrix
- Development of the complete equipment set for determination of a mechanical properties set of the composite reinforced materials on the basis of a polymeric matrix
- Development of scientific-methodical researches in the field of engineers-designers training for group of machine-building universities on the basis of the inter-university automated designing center

- Development of the general principles of the composite reinforced materials application in energy mechanical engineering
- General principles of constructions design from the composite reinforced materials
- Development of methodical maintenance on studying of the automated designing disciplines by students on the basis of the automated designing center

Key Publications

- Trukhnij A.D., Korzh D.D., Lebedeva A.I. Summarizing of the generalized fatigue characteristics of P2MA rotary steel for use in systems of technical diagnostics of a resource finishing (In Russian). Teploenergetika. 2003. № 6. P. 16-21.
- Korzh D.D., Moroz S.F., Nikolaev V.P., Khoroshev A.N. A conceptual basis for students training in active designing (In Russian). Vestnik MEI. 2003. № 5. P. 40 – 44.
- RD 153-34.3-20.672-2002. Methodical instructions on the transmission lines flexible conductors and switching centers inspection on an opportunity of their dangerous approach and whipping at short circuits situations (in Russian). // B.N.Neklepaev, I.P.Krjuchkov, E.P.Kudrjavtsev, M.V.Piratorov, ORGRES Publisher, 2003. 34 p.
- Kudrjavtsev E.P., Neklepaev B.N., Krjuchkov M.V. I.P.Piratorov. Estimations of flexible conductors oscillations at short circuits (in Russian). Elektro, № 6, 2003. 1-8.
- Aleksandrovskij V.N., Karpov A.A., Moroz S.F., Nikolaev V.P. A determination method of durability and deformation ability characteristics of the anisotropic reinforced materials made by winding (in Russian). Proc. of the All-Russia conf. "Human measurement in an information society", All-Russia forum "Educational environment – 2003 ". Moscow, VVC Publisher. 2003. P. 122-123.
- Kochetov A.A., Korzh D.D., Pikalov N.A. Imitating model of thermostressed conditions of a turbine rotor (in Russian). Ibid. P. 40-43.
- Markov K.I., Khoroshev D.A., Khoroshev A.N. Universal software system for electronic training courses support (in Russian). Proc. of the Intern. Conf. " Computerization of training and decision-making processes: "Information means and technologies». Vol/ 1, 2003. Yanus Publisher. P. 209-212.
- Kudrjavtsev E.P., Neklepaev B.N. An engineering technique of dangerous approach of electric nets flexible conductors and switching centers at short circuits (in Russian). Elektrichestvo. 2003. № 4. P. 2-12.
- Methods of students training to the automated designing in modern conditions (in Russian). A.A.Karpov, D.D.Korzh, V.S.Pichugin et al. Proc. of the All-Russia conf. «Educational environment today and tomorrow». Moscow, 29.09 – 02.10.2004). Russian education Publisher, 2004. P. 169.
- Nikolaev B.П., Aleksandrovskij V.N., Karpov A.A., Moroz S.F. Complete adaptations set for the reinforced materials testing on the basis of a polymeric matrix (in Russian). Ibid. P. 235-236.
- Shuklin J.A., Korzh D.D., Orlov K.A. Thermal equipment designing in MathCAD environment (in Russian). Proc. of the Intern. Conf. "Information means and technologies". Oct. 12-14 2004. Vol. 1. Yanus-K Publisher. 2004. P. 96-99.
- Karpov A.A., Korzh D.D. Opportunities of the integrated design systems with the automated synthesis of graphic images (in Russian). Ibid. P. 104-107.
- Nikolaev V.P., Karpov A.A., Korzh D.D. Educational curriculum and courses on the automated designing (in Russian). Ibid. P.100-103.
- Evstigneev V.E., Pitchugin V.S. Development of micro-laboratory with a multimedia support (in Russian). All-Russia forum of education. 2004. P. 218.
- Artamonov J.V., Hanin A.G., Gribkov V.N., Pitchugin V.S. Laboratory electric furnaces with lowered energy consumption. Ibid. P. 250.

Patents

- Pat. 2205455. Organization of the biology micro-lab. Pichugin V.S., Evstigneev V.E., Sergeev S.K., Korobejnikov A.G. 2003.
- Pat. 2205456. Laboratory devices bench for molecular physics and thermo-dynamics laws studying. . Pichugin V.S., Evstigneev V.E., Sergeev S.K., Stepanov S.V. 2003.
- Pat. 2205457. Mini-lab for electro-dynamics. Pichugin V.S., Evstigneev V.E., Alekseev V.V., Polivanov V.V. 2003.
- Pat. 2204865. Device for mechanics laws studying. Pichugin V.S., Evstigneev V.E., Sergeev S.K., Stepans S.V. 2003.
- Pat. 33817. Electric tensometric scales. Pichugin V.S., Artamonov J.V., Khanin A.G. 2003.
- Pat. 52491. Laboratory studying scales. Pichugin V.S., Artamonov J.V., Korobejnikov A.G., Khanin A.G. 2003.
- Pat. 2211088. Electric heater. Pichugin V.S., Yevstigneyev V.E. 2003.
- Pat. 2211490. Micro-lab for chemical experiments. Pichugin V.S., Yevstigneyev V.E. 2003.
- Pat. 2217800. Educational lab for powder materials studying. Pichugin V.S.,Chestnikh P.P., Kuchkovskaja O.V., Karpov A.A. 2003.

Partners

- Engineering StrengthCenter of the Ministry of Nuclear Energy (ITsP MAE), Moscow
- Federal State Unitary Enterprise «Coordination and Analytical Center for Scientific and Engineering Programs of the RF Ministry of Education» (FGUP Tsentr MNTP), Moscow

Unique equipment

- Facility for testing of shafts with a cross-linked structure for torsion
- Tools for testing specimens from composite materials
- The center of the automated designing (Department's CAD Center)

IPM DEPARTMENT OF ENGINEERING DRAWING

Tel: (095) 362-7219

The department has on its staff:
32 teachers

Head of Department
Cand. Sci. (Techn), Professor
Gornov Alexander O. GORNOV

The basic directions of scientific researches

The scientific chiefs

- **Development of electronic data bases for drawings of machine constructing and electro-technical products**

  Prof. Gornov A.
- **Development of teaching methods for engineering drawing discipline considering natural cognitive logic**

  Prof. Gornov A.

Deals, Contracts, Government Budget themes

- Development of the text-book on the discipline «Descriptive geometry. Engineering drawing» for the system of opened education.

Initial Publications

- Gornov A.O. The orthogonal projection of the circuit belonging to the plane of general position (in Russian). Proc/ of the Intern. Conf. «Information means and technology». 12-14 of Oct. 2004. Yanus Publisher, 2004, p.67-71.
- Ochkov V., Kaurkin V., Piskov V. About development of learning methods for the energy equipment by using the means of computer graphic (in Russian). Ibid. p. 71-75.
- Gubarev A., Chakheev E. Graphic design of conve[polyhedrons, which are approximated the real technical objects (in Russian). Ibid. p.75-79.
- Trofimchenko S. About two approaches of developing the drawings in the ACAD system (in Russian). Ibid. p.79-81.
- Kaurkin V. About some peticuliarity of making drawings of energy equipment in the AutoCad system (in Russian). Ibid. p.90-93.
- Gornov A. About continuity of some concepts in the Descriptive Geometry course (in Russian). Ibid. p.93-97.
- Gornov A., Saphonova O. The complex analysis of geometrical forms of the object (in Russian). Ibid. p.100.

IPM SCIENTIFIC & TRAINING CENTER OF GEOTHERMAL ENERGY (STC GEO)

Tel./fax: (095) 673-5619

In STC Geo:
6 researchers,
6 engineers

Scientific adviser,
Dr. Sci. (Techn),
Professor Povarov Oleg A. POVAROV
Director,
Dr. Sci. (Techn)
Valery N, SEMENOV

Main directions of scientific research

Scientific advisers

- **Creation of complex of laboratory and field experimental bench complex, units, instruments and implementation of fundamental researches in the field of formation and flow of multi-phase and multi-component environments**

  Prof. Povarov O.A., Sr. Res. Semenov V.N.
- **Development and creation of equipment for environmentally friendly geothermal power plants**

  Prof. Povarov O.A.
- **Fundamental researches of flows of multi-component geothermal environments in GeoPP equipment elements.**

  Prof. Povarov O.A., Sr. Res. Semenov V.N.
- **Researches of erosion-corrosion physical-chemical processes in two-phase and multi-component environments in substantiation of metals selection for GeoPP equipment**

  Prof. Povarov O.A., Sr. Res. Tomarov G.V.
- **Development and creation of high-performance steam separators for GeoPP**

  Prof. Povarov O.A.
- **Development of protection methods against corrosion, erosion and salt deposition for TEP and GeoPP equipment**

  Prof. Povarov O.A., Sr. Res. Semenov V.N., Sr. Res. Tomarov G.V.

Agreements, contracts, state budget themes

- Creation of technologies and equipment for using geothermal resources with the purpose of electricity generation
- Experimental studying of steam chemical composition and corrosion processes in the turbine
- Studying of deposition formation at pipe surfaces of drum boilers
- Scientific-technical accompaniment of works on designing fluid collection and disposal system of Mutnovsky GeoPP
- Studying of polyamines effect upon turbo-units characteristics
- Working through and improvement of steam preparation system equipment of pilot Verkhne-Mutnovsky GeoPP

Main publications

- *Povarov O.A., Dobrokhotov V.I.* Use of geothermal resources in power engineering of Russia (in Russian). Teploenergetika. 2003. No 1. P. 2-11.

- Energetic ecology (in Russian). *Povarov O.A., Semenov V.N., Tomarov G.V. et al.* Ecology of energy MPEI Publisher. 2003. 716 p.
- *P.A., Tomarov G.V., Nikolski A.I., Semenov V.N.* Modern Russian geothermal energy technologies and their effectiveness (in Russian). Teploenergetika. 2004. No 6. P. 2-12.18
- *Povarov O.A., Semenov V.N., Tomarov G.V.* Fundamental researches in the field of geothermal energy (in Russian). Proc. of the Intern. geothermal seminar. P-Kamchatsky, 2004. P. 112-113.
- *S.N., Povarov K.O.* Problems of reliability and cost-efficiency of power equipment operating on geothermal steam (in Russian). Ibid. P. 44-52.18
- *Povarov O.A., Tomarov G.V., Shipkov A.A., Povarov K.O.* Behavior of admixtures during separation of moisture and phase transformations in power plant technological circuit (in Russian). Izvestia of RF Academy of Sciences. 2004. No 1. P. 147-151.
- *SA.V., Povarov K.O.* Theoretical and experimental researches of turbulent deposition of small particles at GeoPP turbines blades surface (in Russian). Teploenergetika. 2004. No 6. P. 18-24.18
- Potapov V.V., Povarov K.O., Podverbny V.M. Chemical processing and complex use of geothermal fluid (in Russian). Teploenergetika. 2003. No 1. P. 28-36.
- *P.V., Povarov K.O., Podverbny V.M.* Methods of efficiency improving of GeoPP binary units (in Russian(. Teploenergetika. 2003. No 10. P. 41-48.18
- *Semenov V.N.* Concentrating of admixtures in condensate's first drops and liquid films during steam expansion in turbine with saturation line traversing (in Russian). Energosberezhenie i vodopodgotovka. 2004. No 4. P. 48-51.

Dissertations

- *Tomarov G.V.* Increase of reliability and operational resource of power equipment operating in two-phase and multi-component flows. Dr. Sci. (Techn) Dissertation. 2003.

Partners

- Power industry institute (EPRI), United States of America
- RAO «UES of Russia», Moscow
- S.S. Kutateladze Institute of thermal physics, SB of Russian Academy of Sciences, Novosibirsk
- SC «Geotherm-M», Moscow
- SC «Nauka», Moscow

Unique equipment

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

INSTITUTE OF THERMAL POWER ENGINEERING AND TECHNICAL PHYSICS (ITPETP)

Director of the Institute

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Departments of the Institute

ITPE WATER AND FUEL TECHNOLOGY DEPARTMENT

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Department has on its staff:
14 lectures
23 researchers
8 post-graduate students

Head of the Department
Victor N. VORONOV
Dr. Sci. (Tech.), Professor
Laureate of RF President Prize
Honored power engineer of Russian Federation
Member of the International Academy of High School

Main areas of research

Research supervisors

- **Water treatment at fossil fuelled and nuclear power plants**
  Professor T.I. Petrova
- **Water make-up systems at fossil fuelled power plants and treatment of highly mineralized waste water**
  Leading researcher L.G. Vasina
- **Cycle chemistry monitoring systems at fossil fuelled and nuclear power plants. Mathematical modeling of water chemistry processes**
  Professor V.N. Voronov
- **Problems of fuel treatment and preparation**
  Professor B.S. Belosel'skiy
- **Development of automated computer-based simulators for chemical personnel at fossil fuelled and nuclear power plants**
  Associated professor V.F. Ochkov

Contracts and state-budget funded projects

- Generalization of experimental and industrial data on organic inhibitors of salt deposits for guidelines development of their application in heat exchange equipment.
- Reliability and efficiency improvement of fossil fuelled and nuclear power plants' equipment by means of deposits and corrosion products removal from surfaces of water-steam cycles.
- Development and implementation of district heating system water treatment with the aim of corrosion rate and waste water amount decrease.
- Development of cycle corrosion rate monitoring systems considering impact of organic compounds thermal destruction products.
- Informative services, analysis of fossil-fuelled power plants equipment and development of main activities aimed to increase reliability of power plants' equipment.
- Development of water treatment control simulator.
- Development of data analysis software for chemical staff PCs at fossil fuelled and nuclear power plants.
- Optimization of water chemistry at fossil fuelled and nuclear power plants aimed to develop minimum waste water technologies.
- Evaluation of impact of organic compounds presented in water cycle on power plants reliability.

- Elaboration of procedures for power equipment preservation and deposits removal from heat-exchange surfaces.
- Experimental research on impact of water treatment and thermal-physical parameters on deposits formation in boilers.
- Development of water treatment and make-up systems optimization guidelines for environment-friendly coal fired power plants.
- Development of technological algorithms for technical project of primary and secondary cycle chemistry control system as applied to power unit III of Kalininskaya nuclear plant.
- Electronic databases for development of free download software packages and educational simulators.
- Development of concept and software support for teaching complexes and educational simulators for a distant electronic educational network.
- Development of methodological and calculating basis for evaluation of reconstruction methods of make-up systems of different types based on membrane and counterflow technologies.
- Research on physical-chemical processes, design of their logic models and of educational software programs development on that basis for GES-1 operating personnel training.
- Development of software for chemical personnel education and training at «Norilskenergo» TEC-1.
- Development and application of free accessible software for creating educational complexes via network portals.
- Development of guidelines aimed to decrease corrosion rate in the presence organic compounds.
- Optimization of water make-up systems structure and technological parameters.
- Application of new types of coagulants.

Key publications

- Petrova *T.I., Furunzhieva A.V.* Research on acetic acid effect on brass corrosion rate depending on different water treatment (шт Кгыышфт). Vestnik MEI, 2003, № 2, p. 19 – 24.
- Effect of cycle chemistry on generation of corrosion environment in steam turbines and occurrence of corrosion processes. Petrova T.I., Povarov O.A., Semenov V.N., Troitsky A.N., Kashinsky V.I., Petrov A.Yu., Dooley R.B. / Paper presented at the seventh international conference on cycle chemistry in fossil plants, June 3 – 5, 2003, Houston, TX, USA.
- Baseline and IES performance of a direct-fired desiccant dehumidification unit under various environmental conditions. Petrov A.Yu., Zaltash A., Vineyard E.A., Labinov S.D., Rizy D.T., Linkous R.L. / Proc. of the 2003 annual ASHRAE meeting, June 27 – July 02, 2003, Kansas City, Missouri, USA. Paper KC-03-5-2. Available at 2003 meeting proceedings CD.
- Laboratory research on integrated energy systems (IES). Zaltash A., Petrov A.Yu., Rizy D.T., Labinov S.D., Vineyard E.A., Linkous R.L. Proc. of the 21-st Intern. congress of refrigeration, August 17 – 22, 2003, Washington, DC, USA. Paper ICR0203. Available at 2003 conference proceedings CD.
- Environmental Aspects of Operation of Various Gas Microturbines / Zaltash A., Petrov A.Yu., Rizy D.T., Hubbard E., and Langley R. / Proc. of the 20th Intern. Pittsburgh Coal Conf. «Coal – Energy and Environment», September 15-19, 2003, Pittsburgh, PA, USA. Paper CT.5. Available at 2003 Conference Proceedings CD.

- Application of film forming amine for thermal equipment preservation at TEC-23 Mosenergo fossil power plant (in Russian). Petrova T.I., Ryzhenkov V.A., Kurshakov A.V. and others. Teploenergetika, 2003, Vol. 9, p. 56 – 60.
- Voronov V.N., Endrukhina O.V. Mathematical modeling of fossil-fuelled power plants water treatment in non-stationary operating conditions (in Russian). Teploenergetika, 2003, Vol. 7, No. 7. Pp. 63-66.
- Ion-exchange isotherms analysis by means of Mathcad software (in Russian). Ochkov V.F., Pil'shtchikov A.P., Solodov A.P., Chudova Yu.V. Teploenergetika, 2003, No. 7, p. 13 – 18.
- Ochkov V.F. Mathcad: from a graph to a formulation, from a PC calculation to an Internet one (in Russian). Exponenta Pro Publisher, 2003, №4.
- Main regularities of scale formation limiting by means of anti-scale agents (in Russian). Boglovsky A.V., Gorbunov A. V., Serov V.E., Talalayev B.V. Proc. of the Conf. "New technologies in water make-up systems and in corrosion and scale protection of equipment", 2003.Pp. 25-28.
- Boglovsky A.V., Vasina L.G. Water treatment improvement in distillation-demineralizing systems (in Russian). Proc. of the Intern. seminar "Water world – 2003", 2003, May 12 – 14, Obninsk, pp. 33-34.
- Research on corrosion intensity in multi-step evaporating systems (in Russian). Sedlov A.S., Boglovsky A.V., Zonov A.A., Lunin K.A. Proc. of the Conf. "Efficiency improvement power generating", 2003, Novocherkask, p. 182 – 184.
- Main regularities of scale formation limiting by means of anti-scale agents, and experience of implementation of PAF-13A agent water treatment technology (in Russian). Boglovsky A.V., Gorbunov A. V., Serov V.E., Talalayev B.V., Krylova L.S. Novosti teplosnabzheniya, 2003, № 11, p. 42 – 46.
- Effect of coagulant basis modulus and water stability while choosing optimum coagulation (in Russian). Vasina L.G., Men'shikova V.L., Krylova L.S., Yevsyutin A.V. Proc. of the Intern. conf. on water treatment "Technovod-2004", 2004, Novocherkask, p. 136 – 140.
- Scale formation regularities in water-heating equipment in district heating systems (in Russian). Boglovsky A.V., Balaban-Irmenin Yu.V., Vasina L.G., Rubashov A.M. Energosberezheniye i vodopodgotovka, 2004, № 3, p. 10 – 16.
- Steel corrosion in evaporating systems (in Russian). Sedlov A.S., Boglovsky A.V., Lunin K.A., Zonov A.A. Energosberezheniye i vodopodgotovka, 2004, № 1, p. 86 – 88.
- Aleksandrov A.A., Orlov K.A., Ochkov V.F. Research on combined cycles with water steam injection into gas cycle based on applied software on properties of the body inside combined cycles (in Russian). Novoye v rossiyskoi elektroenergetike, 2004, №4, pp. 28-37.
- Software "Videofeeds on engineering safety" (in Russian) / Kondakova G.Yu., Kondrat'yev Yu. G., Orlov K.A. and others. / Energetik, 2004, № 6. Pp. 25-33.
- Ochkov V.F. Water make-up systems' calculations available on the Internet (in Russian). Energosberezheniye i vodopodgotovka, 2004, № 3, p. 72 – 73.
- Ochkov V.F. About Submin key in Mathcad package Webcontrols set or network and non-network pseudo animation in Mathcad (in Russian). Exponenta Pro, 2003, №1, Pp. 88-90.
- Ochkov V.F. Mathematical packages: On the way from barter to goods generation via Internet (in Russian). ComputerPress, 2004, № 5.
- Ochkov V.F. Mathcad application server: new opportunities in open education (in Russian). Yedinaya obrazovatel'naya informatsionnaya sreda, 2004, № 3. Pp. 54-57.

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- Effect of Acetic Asid on Mass Transfer of Copper Corrosion Products in Fossil Power Plant Cycle / T.I. Petrova, A.V. Furunzhieva // Proc. of the Intern. Conf. on the Properties of Water and Stream. Kyoto, Japan. August 29 - Sept. 3, 2004.

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- Pauli Ye.V. Research on joint water treatment and heat-power parameters effect on efficient performance of power plants equipment. Cand. Sc. (Tech.) Dissertation, 2003.
- Veselovskaya Ye.V. Improvement of power plants' operating and ecological indices with complex application of sorbtion technologies. Dr. Sc. (Tech.) Dissertation, 2003.
- Rusakova M.V. Research on processes and elaboration on vanadium-containing sediment treatment at power plants with the aim of its utilization. Cand. Sc. (Tech.) Dissertation, 2004.
- Orlov K.A. Research on combined cycles scheme on the basis of applied software on properties of the cycle working body. Cand. Sc. (Tech.) Dissertation, 2004.

Partners

- JSC "Mosenergo", Moscow
- JSC All-Russia Research Institute of Nuclear Power Engineering (VNIIAM), Moscow
- JSC All-Russia Thermal Engineering Institute (VTI), Moscow
- Electric Power Research Institute (EPRI), Paolo-Alto, USA
- Oak Ridge National Laboratory, Oak Ridge, TN, USA
- JSC Kaluga Turbine Works (KTZ), Kaluga
- Russian Scientific Centre "The Kurchatov Institute", Moscow
- JSC Enterprise for Power Plants Maintenance (ORGRES), Moscow
- Co-generation power plants TEC-21, 22, 23, 25, 28, GRES-4 JSC "Mosenergo", Moscow
- Aleksin Co-generation Power Plant JSC "Tulenergo", Aleksin
- Pervomaiskaya Co-generation Power Plant 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 Centre on Nuclear Plants Safety (ENITs), Elektrogorsk, Moscow region

Unique equipment

- Analyzers for determination of micro concentrations of water impurities:
- Ion-chromatograph (Dionex, USA)
- Atomic-absorbtion spectrometer (AAS-2, Germany)

- Sodium analyzer (Orion, USA)
- Test rig for studies on corrosion rate, impurities behavior in water and steam at operating parameters of power generating equipment
- Cycle chemistry monitoring system
- Test rig for studies on deposits formation

ITPE DEPARTMENT OF THERMAL POWER STATIONS

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Department has on its staff:
19 lecturers
14 researchers
13 Ph.D. students

Head of the department
Dr. Sci, (Tech.)
Prof. Anatoly S. SEDLOV

Basic Research Areas

Scientific Leaders

- **Low waste water treatment and wastewater treatment technologies based on thermal-chemical desalination method**
  Prof. A.S. Sedlov
- **Design of schemes and equipment for thermal water treatment**
  Prof. A.S. Sedlov
- **Development of power- and resource saving technologies for thermal power plants**
  Prof. A.S. Sedlov
- **Designing and optimization of gas-turbine and combined turbine heat power plant cycles and parameters**
  Assoc. Prof. V.D. Burov
- **Study on investment cost efficiency at the stage of thermal power plant designing**
  Assoc. Prof. V.D. Burov
- **Investigation of application problems of the gas-piston installation in power engineering**
  Assistant Prof. Valery D. Burov
- **Optimization of thermal and nuclear power plant cycles, parameters and profiles**
  Prof. S.G. Tishin
- **Optimization of thermal power plan operation modes**
  Assoc. Prof. E.T. Il'in
- **Development of method for thermal power plant equipment service condition automatic monitoring**
  Assoc. Prof. E.V. Dorokhov

Agreements, Contract, Topics financed through the Budget of the Russian Federation

- Development and creation of software product for calculation payments for environmental pollution by waste water as applied to the conditions of CHPP-21 MOSENERGO
- Analysis of domestic and foreign experience and development of recommendations for selection and basing of directions of perspective power engineering construction taking into account a policy in the field of energy saving and increasing of ecological effectiveness
- Analysis and summarizing of main directions of community air protection during creation of energy technological complexes on the basis of ecologically clear fossil-fuel HPP

- Design of technical suggestions for operation optimization of reconstructed water treatment schemes of CHPP-11 MOSENERGO
- Ecological and economical evaluation of water treatment methods for power engineering boilers of various parameters
- Investigation of heat exchange and development of heat design methodic of evaporators under above-critical concentrate mineralization
- Study of water-chemical regime and design of technical proposals for optimization of water treatment plant MES-60 amounting to CHPP-28 MOSENERGO
- Thermal tests of steam turbo-installations PT-65-130 of power units № 3,4,5,6
- Calculation and optimization of heat supply schemes with the application of heat pump plants
- Rendering of services to training for energy saving Program MOSENERGO in 2005 with the perspective to 2020
- Execution of control measurements of turbine heat scheme parameters of Kalininskaya NPP power units in control operation modes for ensuring parameters values, which are not measured, and rates characterizing power engineering effectiveness of equipment with the designing of recommendations for turbo-installation economy rising
- Development of technical suggestions and recommendations for reducing the consumption of water and quantity of wastewater in CHPP-23 MOSENERGO
- Evaluation of natural brine quality effect to the efficiency of Na-cation-exchange filters regeneration and development of technical suggestions for minimization of chloride discharges
- Development and creation of new uniform high-precision magnetic level gage for vessels under pressure
- Preparation of reference to the report of public corporation «IK ZUMAR» about technical project of exhaust-boiler for CCP-325
- Development of technical suggestions for a heat scheme type of steam-gas power unit №2 for Tyumen CHPP-1 reconstruction
- Development of technical suggestions for economy operation rising of heat-and-power engineering equipment for producing electric and thermal energy
- Investigation of gas turbine HPP rates with desalted water treatment
- Selection of main technical decisions and a computation of technical and economic showings of gas turbine CHPP with 10 MW capacity
- Calculation of steam-gas CHPP heat schemes on the basis of GTP-16PER
- Computation of main resources and investment effectiveness evaluation of Dvurechensky gas turbine HPP construction
- Investigation of structure and parameters of steam-gas HPP with the single-turbine exhaust-boilers
- Analysis and investigation of effectiveness problem of steam-gas technology application on example of CHPP-MPEI

Key publications

- The problems of sludge utilization of HPP's prerefining and possible ways of their decision (in Russian) / Bessmertnykh A.B., Grigor'yants P.P., Miroshnichenko B.I. etc. // Energosberegenie i vodopodgotovka, 2003, no.1, p.33-37
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- Perspective schemes of thermal demineralizing installations for CCP HPP and their thermal efficiency comparison (in Russian) // Sedlov A.S., Ghidkikh V.F., Alekseev A.G. etc. // Electronic journal «Novoe v rossiyskoy elektroenergetike», 2003, no.12, p.18-25
- Experience gained during the assimilation of evaporation plant for make-up water treatment in North-West CHPP (in Russian) / Kopsov A.Ya., Kostyuk R.I., Piskovatskov I.N. etc. // Elektricheskie stantsii, 2003, no.12, p.46-51
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- Characteristics of GTP-CHPP designing on the basis of Russian conversion gas turbine (in Russian) / Burov V.D., Tsanev S.V., Kuznetsov N.G., Yakupov Sh.R. // Ibid, p.32-35
- Thermal economy estimation procedure of power complexes utilizing CCP and secondary resources (in Russian) / Burov V.D., Tsanev S.V., Shtyk O.A., Sokolova M.A. / / Proc. of the Intern. conf. «Status and prospects of electrical technologies development». – Ivanovo, 2003, vol.1, p.166
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- Technical and economic efficiency evaluation of GTP-HPP modernization using steam-gas technology (in Russian) / Makarevich V.V., Burov V.D., Torzhkov V.E. etc. // Gasoturbinnye technologii, 2004, no.1, p.2-7
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- Burov V.D. Lower-power gas-turbine and gas displacement power engineering plants (in Russian) // Gorny ghurnal, 2004, special issue, p.87-89
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- Application features of aircraft-drive GTP in power stations (in Russian) / Tsanev S.V., Burov V.D., Torzhkov V.E., Yakupov Sh.R. Ibid, p.132-136

Patents

- The method of water treatment / Shishenko V.V., Sedlov A.S., Sidorova S.V., Moiseytsev Yu.V. // Patent for invention №2195432, 2002, 3p.
- The method of sewage water treatment of ion-exchange demineralizing installations / Shishenko V.V., Sedlov A.S., Khaziakhmetova D.R. // Patent for invention №2205799, 2003, 3p.
- The device for measurement the level of fluid / Sedlov A.S., Fedorov K.A., Il'ina I.P., Kartsev A.S. // Patent for utility model №33437, 2003, 3p.

Dissertations

- Torzhkov V.E. Study and optimization of characteristics of lower and middle-power steam-to-gas condensing plants with single-circle exhaust-boilers. Cand. Sci. (Tech.) Dissertation. 2003
- Agapov R.V. Efficiency investigation of MEP diagrams with different types of evaporators under concentration of many-component solutions. Cand. Sci. (Tech.) Dissertation. 2003
- Sokolova M.A. Study of structure and operation modes of CCP with parallel working diagram at subcritical steam parameters. Cand. Sci. (Tech.) Dissertation. 2003
- Kartsev A.S. Investigation of mineralization influence on hydrodynamics and heat exchange in boiling type evaporators. Cand. Sci. (Tech.) Dissertation. 2004
- Melinova L.V. Study, design and perfection of thermal distilling desalinating complexes for HPP. Cand. Sci. (Tech.) Dissertation. 2004
- Galas I.V. Design, investigation and embedding of technological and constructive arrangements to support ecological safety, exploitation reliability and power engineering equipment economy. Cand. Sci. (Tech.) Dissertation. 2004
- Lunin K.A. Study and optimization of multistage evaporation plants taking into account corrosion of heating surface. Cand. Sci. (Tech.) Dissertation. 2004
- Dudolin A.A. Investigation of climatic factors and type of GTP influence on the selection of utilization type of steam-to-gas CHPP flow diagram structure. Cand. Sci. (Tech.) Dissertation. 2004

Partners

- PC «MOSENERGO», Moscow
- GRES-3, GRES-24, CHPP-8, 11, 21, 22, 23, 25, 26, 28 PC «MOSENERGO», Moscow
- RAO «UES of Russia», Moscow
- Stuttgart University, Germany
- PO «Tatenergo», Kasan
- PC «Mordovenergo», Saransk
- PC «Smolenskenergo», Smolensk
- PC «Belgorodenergo», Belgorod
- LLC «Siemens», Moscow
- Mosenergoproekt Design Institute, Moscow
- CC «MR-Energo-Stroi», Moscow
- PC «Podolsk Machinery Construction Works» (ZIO), Podolsk, Moscow region
- PC «Vserossiyskiy teplotehnicheskiy institut» (VTI), Moscow
- Berlin Technical University, Germany
- CC «Promyshlenno-financovaya gruppa «AviaRus-21», Moscow
- PC «Company «EMK-Engineering», Moscow
- PC «NPO Saturn», Rybinsk
- Joint Institute of high temperatures RAN, Moscow
- PC «Aviadvigatel'», Perm'
- FGUP NPP «Motor», Ufa
- CC «NPO VNIIEF-Volgogas», Sarov
- PC «Kalughskiy turbinnyi zavod», Kaluga
- PC TKZ «Krasnyi kotel'schik», Taganrog
- International unit of machine constructors, Moscow
- Konakovskaya GRES, Konakovo
- PC «Firma ORGRES», Moscow
- MMPP «Salut», Moscow
- Institute Teploelektroproekt, Moscow
- GUP «Mosteploenergo», Moscow

ITPE DEPARTMENT OF AUTOMATED CONTROL SYSTEMS FOR THERMAL PROCESSES

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26 lecturers,
11 research workers,
and 25 Ph.D. students

Head of Department:
Edik K. ARAKELYAN
Dr. Sci. (Tech.), Prof.
Member of the Engineering Academy of Armenia

■ Main Lines of Research

Research supervisors

- **Development of conception for designing and updating of integrated process control systems at electric stations on the basis of advanced hardware**

  Prof. E.K. Arakelyan, Prof. M.A. Pan'ko

- **Development of the control system theory for thermal power equipment and technological objects**

  Prof. V.Ya. Rotach, Assoc. Prof. V.V. Volgin

- **Methods of investigations, calculations, and metrological characteristics improvement for primary converters of complex structure used in power industry**

  Assoc. Prof. G.M. Ivanova

- **Development of technological problems in testing and technical diagnostics of main and auxiliary equipment, problems of the process control system of a power stations including at control systems constructing and updating on the base of the state-of-the art hardware.**

  Prof. E.K. Arakelyan, Assoc. Prof. V.S. Mukhin

- **Operating modes optimization for main and auxiliary equipment of power stations**

  Prof. E.K. Arakelyan, Sr. Researcher V.A. Makarch'yan, Assoc. Prof. S.V. Mezin

- **Fundamentals development for advanced computer simulators creation for operation staff of power stations**

  Prof. E.K. Arakelyan, Assoc. Prof. V.P. Zver'kov

- **Control systems synthesis on the base of microprocessor controllers allowing to ensure of complex controlling rules**

  Prof. V.Ya. Rotach, Assoc. Prof. V.P. Zver'kov

- **Development of universal-purpose software for the power boilers effectiveness evaluation at operating on mixed fuels**

  Assoc. Prof. V.R. Sabanin, Assoc. Prof. N.I. Smirnov

- **Software package development for a test-reference system of the thermal power station's personnel knowledge checking**

  Assoc. Prof. V.R. Sabanin, Assoc. Prof. N.I. Smirnov

- **Repair activity management and optimization at a power station and in a power system**

  Chitf-Researcher Kudriavyi V.V., Leading Researcher A.V. Andryushin

- **Development and application of automatic technical diagnostic systems at thermal and nuclear power stations**

  Prof. E.K. Arakelyan, Sr. Researcher V.A. Makarch'yan

- **Diagnostics of information subsystems of a process control system with usage of artificial intelligence technology**

  Assoc. Prof. V.R. Sabanin, Assoc. Prof. N.I. Smirnov

Agreements, Contracts, Projects Supported by State Budget

- Development, investigation, and application of the sliding control under reduced electrical load conditions at thermal power stations with crossed connections
- Pilot industrial application at a power unit of diagnostic sub-systems of the main steam line, injection headers, and boiler super-heater
- Software for calculation of technological processes control systems for thermal power stations at designing stage
- Software for the regulators tuning automation based on microprocessor controllers in process control systems at thermal power stations at their implementation and the subsequent operation stages.
- Creation a computer network simulator for training the thermal power station's operation staff
- Economic, ecological and reliability data investigations and their time changes for optimization of scheduled maintenance activities.
- Development of a procedure for electric load sharing among power units taking into account the environmental limitations
- Development of structures designing methods and algorithms for automatic control in advanced process control systems
- Improving the measuring procedures for heat consumption with hot water and steam for a wide range of consumers.
- Development of algorithms and program implementation of process control system for TPS and NPS initial information reliability

Key Publications

- V. Ya. Rotach The theory of automatic control, MPEI Publisher, 2004.
- Volgin V.V. Estimation of an ACS economic efficiency for technological processes (in Russian). Promyshlennye ASU i kontrollery. 2004, no. 8. Pp.-4-6.
- E. K. Arakelyan and M. A. Pan'ko Usage of fuzzy sets theory for control optimization on power plants (in Russian). Ibid, pp. 7-9.
- Zver'kov V.P., Kuzishchin, V.F., Rozhkov V.N. Economic efficiency of gas analyzer KGA-8C usage for process of combustion optimization (in Russian). Promyshlennye ASU i kontrollery. 2004, no. 10. Pp. 24-30.
- Krokhin G.D. and Mukhin V.S. Metric "resembling" usage for estimation of a power equipment status at power stations in rate of the process (in Russian). Promyshlennye ASU i kontrollery. 2004, no.11. Pp. 27-29.
- E.K. Arakelyan and M.A. Pan'ko. Problems of Selecting a Plant Management System for Automated Control of the Technological Processes at Power Units of Thermal and Nuclear Power Plants (in Russian), Teploenergetika, 2004, no. 10. Pp. 2-5.
- V.Ya. Rotach The Possibility of Implementing Fuzzy Controllers in Practice (in Russian). Teploenergetika, 2004, no. 10. Pp. 6-9.
- N.I. Smirnov, V.R. Sabanin, and A.I. Repin Optimizing the Tuning Parameters of Automatic Control Systems Having a Differentiator (in Russian). Teploenergetika,2004, no. 10. Pp. 10-16.

- A. V. Andryushin and E. Yu. Shnyrov Using Project Management Philosophy to Develop a System for Organizing Repairs to Power Equipment (in Russian). Teploenergetika, 2004, no. 10. Pp. 17-21.
- R. E. Sarkisyan, E. K. Arakelyan, and A. A. Aliev. Models of Multicriterial Problems and the Principles of Choosing Rational Solutions for the Restructuring of Power Facilities (in Russian). Teploenergetika, 2004, no. 10. Pp. 22-27.
- M. A. Pan'ko. Calculating the Tuning of PID Controllers with the Control Algorithm Implemented in Digital Form (in Russian). Teploenergetika, 2004, no. 10. Pp. 28-32.
- Gf0 M. Ivanova and S. P. Yachina. The Relationship between Algorithms for Calculating the Heat Released from Heat Sources and the Errors in Its Metering (in Russian). Teploenergetika, 2004, no. 10. Pp. 33-39.9
- e1049Arakelyan, E.K., Pikina G.A.Optimization and optimum control, MPEI Publisher, 2003.
- Vf0 Ya. Rotach and K. A. Grishin. An Expert Estimate and Optimization of Control Algorithms under Conditions of Incomplete Information on the Object Model (in Russian). Teploenergetika, 2003, no. 10. Pp. 2-8.9
- Ivanova G.M., Danilov E.A., Brigadenko I.N. Is it really suitable the prolonged recalibration interval of the heat counter device at broadened consumption measuring range? (in Russian). Evergosberejenie, 2003, no. 5. Pp. 14-17.
- Sich V.R., Smirnov N.I., Repin A.I., Arakelyan E.K., Makarov O.N., Andreev S.N. Mathematical and software for correction algorithm of measured parameters for technical and economic metrics on HPP calculation, Vestnik MEI, 2003, no.1. Pp. 21-27.9

Dissertations

- Ma E.I. Heat and electric loading distribution optimization among power units of TPS witn account of initial information uncertainty. Cand. Sc. (Tech.) Dissertation, 2004.9
- l modeling, optimization, control and diagnostics the air condenser of steam power unit. Cand. Sc. (Tech.) Dissertation, 2004.
- Ppar Institute of Technical Processes, Automation, and Process Measurements of the Applied Sciences University, Zittau, Germany9
- th-Chinese Electrical Power Engineering Institute, China
- NUniversity of Cheju, Republic of Korea9
- ar JSC Mosenergo, Moscow
- OES Rossii (Unified Power System of Russia) company, Moscow9
- ons TETs-27 and TETs-25 of JSC Mosenergo, Moscow
- Sstrict Power Station GRES-2, Surgut9
- Association NPTeplopribor, Moscow
- RInstitute for Environmental Problems of Power Engineering (NII EPE), Rostov-on-Don9
- te for Comprehensive Automation (TsNIIKA), Moscow
- Ersk Research Center for Safety of Nuclear Power Stations (ENITs VNII AES),9
- ion
- I Mosenergoproekt of Mosenergo, Moscow9
- stitute n. G.M.Krjijanovski (ENIN)

ITPE DEPARTMENT OF THE THEORETICAL ENGINEERING FOUNDATIONS NAMED AFTER V.P. VUKALOVITCH

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Department has on its staff:
20 lectures
8 researchers
7 Ph.D. students

Head of the department
Cand. Sci., Assoc. Prof.
Andrey. A. SUKHIKH

Main scientific researches

- **Complex investigations of thermophysical properties of ozone-friendly working substances for heat pumps and refrigerating plants of new generation.**
  Prof. A.A. Alexandrov, Assoc. prof. Sukhikh A.A., Assoc. prof. V.F. Utenkov
- **Investigations of thermophysical proprieties of water, water steam and aqueous solutions for heat-and-power engineering.**
  Prof. A.A. Alexandrov
- **Investigations and optimization of characteristics of thermal power plants using exergy and entropy methods.**
  Assoc. Prof. N.Ya. Filatov
- **Complex investigations of physical properties of high temperature superconducting substances.**
  Assoc. Prof. N.Ya. Filatov.
- **Development of highly effective heat exchanging systems**
  Assoc. prof. V.A. Pronin
- **Intensification of convective heat exchange in elements of energy plants**
  Assoc. prof. V. I. Velichko.
- **Development of computer simulation models for designing and diagnostics of condensing devices**
  Prof. A.P. Solodov, Assoc. prof. E.V. Ezhov.
- **Thermodynamic analysis of combined steam-gas cycles.**
  Prof. V.S. Okhotin.
- **Renewable energy sources**
  Prof. B.I. Kazandzhan.
- **Numerical simulation of heat and mass transfer in power engineering units.**
  Assoc. prof. D.V. Sidenkov.
- **Development of thermophysical foundations of supercritical purification technologies utilization of polluted substances in heat-power installations**
  Assoc. prof. A.A. Sukhikh, Assoc. Prof. N.Ya. Filatov

Agreements, contracts

- Investigation of PVT-data of fluorine ether and its binary mixtures in vapor state and on saturation curve.
- Experimental and theoretical investigations of thermal physical properties of working substances and heat carriers in thermal and refrigerator plants.
- Preparation of analytical report about the state and prospects of utilization of renewable energy sources in European Union countries.
- Theoretical and experimental methods of investigation of thermophysical properties of actuating fluids, energy carriers and materials.

- Basic equations of state for technically important substances in liquid and gaseous phases including critical region.
- Prediscovery for creation of autonomous sources of energy supply on the basis of catalytical oxidation of hydrocarbon fuels.
- Development of the design procedure and technical proposals relative to contact heat exchange in combined-cycle plant.
- Creation of experimental test bench for investigation of super critical cycles of thermo transformers and processes of heat-mass exchange in heat pump plants.
- Development of solution methods for the radiation transfer equation for basic Grin function of diffused light field.

Key publications

- B.I. Kazandzhan. Modern systems of solar heat supply and hot water supply (in Russian). / Renewable energy sources. Lectures of leading specialists. Volume 2. MGU Geographic Faculty Publisher. 2003. Pp. 53-66.
- B.I. Kazandzhan. Modern solar and wind power installations (in Russian) / In the book Power Engineering Ecology. Under ed. Of Putilov V.Ya. MPEI Publisher, 2003.
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Patents

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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 energetics of Russian Federation, Moscow.
- OAO «Gasprom», Moscow.
- RAO «UES of Russia», Moscow
- State scientific center «All-Russian scientific–research institute of non-organic materials named after Acad. A.A. Bochvar» (VNIINM), Moscow.
- All-Russian scientific–research institute of oil mashines building (VNIINEFTEMash), Moscow
- Kazan State University of Technology, Kazan.
- State academy of refrigeration and food technologies, St.Peterburg.
- All-Russian scientific–research center of standartization, informatization and certification of raw materials, materials and substances, Moscow
- All-Russian scientific–research institute of natural gases and gas technologies (VNIIGas), Moscow region
- AO «Podolsky mashinebuilding plant? (ZIO), Podolsk, Moscow region

Unique installations

- Precision experimental installations for investigation of liquid –vapor equilibrium and volume relationship of mixtures of low-boiling substances.
- Precision experimental installations for investigation heat capacity, thermal and electric conductivity high –temperature super-conducting materials.
- Unique stand for cleaning of dirty mediums with using of supercritical technologies
- Experimental installation «Heat pump TH-300»

ITPE DEPARTMENT OF BOILER PLANTS AND ECOLOGY OF POWER ENGINEERING

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18 lecturers,
19 research workers,
and 5 Ph.D. students

Head of Department:
Eduard P. VOLKOV,
Dr. Sci. (Tech.), Professor,
Corresponding member of the Russian Academy of Sciences

Main Directions of Research

Research supervisors

- **Investigation of air basin pollution in industrial cities and power industry complexes by emissions from power enterprises and development of automated data banks for equipment of thermal power stations and boiler houses.**

  Assoc. Prof. V.B. Prokhorov
- **Development of a catalytic thermal power station with complete suppression of nitric oxides formation.**

  Assoc. Prof. V.B. Prokhorov
- **Development, investigation and application of high-effective technologies of staged combustion of coal, gas, and fuel oil on the basis of flame aerodynamics optimization.**

  Lead. Researcher A.M. Arkhipov
- **Improving the reliability, efficiency, and environmental performance of ash and slag removal systems and pulverized-coal feed systems at thermal power stations**

  Assoc. Prof. V.Ya. Putilov
- **Optimization of fuel utilization and heat supply.**

  Assoc. Prof. A.V. Izvekov
- **Noise suppressing from power equipment.**

  Prof. V.B. Tupov
- **NO*x* emissions decrease from power equipment and fire neutralization of waste waters.**

  Prof. V.I. Kormilitsyn
- **Improving the ashes suppression level of electrical precipitator**

  Sr. Researcher S.L. Chernov
- **Improving the funnels operation reliability**

  Assoc. Prof. V.B.Prokhorov, Sr. Researcher S.L. Chernov
- **Development of electrodynamic monitoring of heat-carrier quality and improvement of the technologies for protecting the metal of power equipment against from lay corrosion.**

  Sr. Reseascher I.Ya. Dubrovskii-Vinokurov

Agreements, Contracts, Projects Supported by State Budget

- Environmental impact of cogeneration power stations and evaluation of the environment protection measures efficiency carried out at JSC «Mosenergo».
- Creation of an informational automated data bank containing technical and ecological characteristics of boiler equipment used in Moscow

- Development of an environmentally clean catalytic thermal power station with manufacturing of 2-MW heat power pilot installation
- Investigation of aerodynamic resistance of gas paths in different types of boilers and development of the recommendations for retrofitting their gas paths to ensure operation under rated load conditions
- Aerodynamic design of the KV-GM-120 boilers gas path at the district thermal plant «Mitino»
- Development of guidelines for designing and of recommendations for the erosion wear decreasing of air conveying equipment of pulverized coal preparation systems and ash and slag removal systems at thermal power stations
- Research of basic tenets and development of a mathematical model of the equipment erosion wear in ash and slag removal system and pulverized-coal supply systems used for pneumatic transportation of fine loose materials
- Development of recommendations on noise reduction from gas boiler houses of «Mosteploenergo»
- Study of noise characteristics of burners used in gas boiler houses
- Detail design, manufacturing, and application of a noise muffler for PTVM boilers
- Experimental solutions for a layout and arrangement of noise suppressors at steam discharges from the Mutnovskaja GeoTPS
- Development of recommendations on reduction of the noise generated by the cooling and pressure-reducing unit and the quick-acting pressure reducing and cooling unit at Efremovskaya co-generation power station
- Monitoring of the environmental noise impact from the co-generation power stations of Mosenergo and formation the recommendations for noise level controlling
- A procedure for processing the statistical data on damages to district heating network pipelines
- Development of materials for designing of natural ventilation systems for channels of hot water networks
- Development, investigation, and application of staged combustion of pulverized Kuznetsky coal and blast-furnace gas to improve the reliability and efficiency of furnaces and to control NOx emissions to the atmosphere
- Development and application of a low NOx technology of staged combustion gas and fuel oil combustion technology at BKZ-420 PGM, TP-80, and BKZ-420 NGM boilers of the Dzerzhinskaya co-generation power station
- Engineering solutions and a preliminary design for converting a TP-87 boiler at the ZS co-generation power station to dry slag removal for controlling NO_x emissions
- Development and creation of a sprayer for oily waste water for the fire decontamination in steam boiler furnaces
- Development and application of a cavitation unit for preparation of water-oil emulsion
- Recommendations development for improvement of the environmental characteristic and performance of a fuel oil-fired DE-4/14 boiler
- Development of a system for controlling an installation on the basis of its ecological indices and performance when burning power fuels.
- Humidity measurements in fuel oil and water-fuel oil emulsions
- Humidity measurements of the oil in a turbine lube oil system
- Measurements of water entrainment from a scrubber of an air separation plant

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- Putilova I.V. Erosion wear of pneumatic transportation installation pipelines for ash and slag disposal systems of TPP, Cand. Sci. (Tech.) Dissertation, 2004.

Partners

- Ministry of Nature of the Russian Federation
- JSC RAO UES of Russia, Moscow
- State Unitary Enterprise «MOSTEPLOENERGO», Moscow
- All-Russia Thermal Engineering Institute, Moscow
- JSC «Institute VNIPIEnergoprom», Moscow
- JSC Institute Teploelektroproekt
- JSC Institute Energosetproekt, Moscow
- JSC URALORGRES, Ekaterinburg
- JSC «URALVNIPIENERGOPROM», Ekaterinburg
- JSC «Firm ORGRES»

- JSC «Mosenergo», Moscow
- JSC ENIN, Moscow

Unique equipment

- 2800 Frequency analyzer and 800 B noise-level meter of «Larson&Davidson» Co. and other modern equipment for acoustic measurements

ITPE NUCLEAR POWER STATIONS DEPARTMENT

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18 lecturers
6 scientific researchers
12 Ph.D. students

Head of Dept. Professor Vasily D. KUZNETSOV

Main directions of researches

Scientific leaders

- **Research of passing processes at severe accidents on NPP with PWR type reactors**
  Professor Rassokhin N.G.
- **Safety and Reliability analysis of NPP**
  Professor Kuznetsov V.D.
- **Estimation of operability and service life of NPP structural materials and equipment**
  Professor Gorbatykh V.P.
- **Methods and means of NPP technical diagnostic**
  Professor Proscuryakov K.N.
- **Development of the calculation theory for natural circulation, hydraulic characteristics and distributions of impurity in the Steam Generation equipment of the NPP**
  Professor Gorburov V.I.
- **Development of an automated system for NPP flow diagrams simulation and calculation**
  Professor Zorin V.M.
- **Selection of decommissioning strategy of NPP unit whose specified service life is expired**
  Associated Professor Skachek M.A.
- **Internal fuel cycles of WWER-type reactor**
  Associated Professor Biabakov V.D.
- **Development of fundamentals and particular procedures for safety standards usage at NPP and at other enterprises of the nuclear power industry**
  Professor Tevlin S.A.

The contracts, funding of government

- Reliability improving and ecological monitoring of nuclear industry plants and power plants.
- Development of PC software for hydrodynamic calculation and distribution of impurities in the NPP steam generator with a submerged heating surface.
- Development of system approach for NPP reliability and safety. Use of artificial intelligence for control of the reliability and safety of NPP new generation.
- Development of calculation code for simulation of thermal processes in problems of severe accident localization on NPP with WWER reactors.
- Validation of WWER-1000 fuel loadings with asymmetrical fuel assemblies on structure of fuel in cross section.
- Development of technology and experimental check of chemical clearing for connection point of "collector – tube" of horizontal steam generator.
- Development and creation of system for monitoring and control of a residual resource for separate parts of the NPP SG and for whole steam generator

- Development of system approach to NPP safety.
- Development of calculation codes for improving of the NPP safety.
- Development of methods for control of NPP safety.

The main publication

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- Bajbakov V.D., Vorobyov J.B., Kuznetsov V.D. Codes for calculation of nuclear reactors. MPEI press , 2003, 161 p. (in Russian)
- Tevlin S.A. Nuclear power plants with WWER-1000 reactors. – MPEI press, 2002, 344 p., (in Russian)
- Vorobyov J.B., Kuznetsov V.D. Possibility of joint use of neural networks and codes in system for support of NPP operator. News of higher educational institutions – Yadernya Energetika №4, Obninsk, 2002, (in Russian)
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- Bajbakov V.D., Zorin V.M. Optimization of dividing pressure of the NPP turbines (in Russian). Teploenergetika, № 10, 2003, pp.54-60Artemov V.I., Zorin V.M., Shamrackov A.S., Yankov G.G. Modeling of processes in air heat exchanger of emergency cooling system of the NPP BN-800 (in Russian). Teploenergetika, №3, 2004, pp. 30-38
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- Gorbatykh V.P., Morozov A.V., Parphyonov V.V., Ivanov S.O. Analytical diagnostics of metal condition and methods of a residual service life control of the NPP with WWER (in Russian). Proc. of the 3-rd scientific and technical conf. «Safety of the NPP with WWER», vol. 4, Podolsk, 26-30th of May, 2003, pp. 88-96
- Gorbatykh V.P., Morozov A.V., Parphyonov V.V., Dubar A., Ivanov S.O. Longevity of constructional alloys of collectors and tube bundles at the NPP steam generators with WWER at contact to corrosion environment (in Russian). Proc. of the Intern. conf. on

problems of nuclear engineering «Reliability, safety, efficiency of the power equipment of the NPP», Ukraine, Sevastopol – Batiliman, 18-22nd of September, 2003, pp. 32-38.

- Gorbatykh V.P., Morozov A.V., Parphyonov V.V., Ivanov S.O. Longevity of constructional alloys on conditions of local strength (in Russian). Ibid, pp. 64-73. Dissertations
- Povarov V.P. Development and improvement of experimental determination technique of WWER-1000 neutron-physical characteristics. Cand. Sc. (Tech.) Dissertation, 2003.
- Socolin A.V. Numerical modeling of steam explosion at severe accident on the NPP with PWR type reactor. Cand. Sc. (Tech.) Dissertation, 2004.
- Golumpur M. Numerical and experimental substantiation of acoustic models of the coolant in the equipment of the NPP with WWER and PWR. Cand. Sc. (Tech.) Dissertation, 2004.
- Sidorov A.S. Localization and cooling of corium in severe accident of the WWER at destruction of core. Cand. Sc. (Tech.) Dissertation, 2004.

Partners

- Volgodonskaya NPP, Volgodonsk
- Federal state unitary filial enterprise «All-Russia scientific research institute of NPP» (FGUDP VNIIAES), Moscow
- High engineering school, Zittau, Germany
- The Dresden Technical University, Germany
- Kalininskaya NPP, Tver
- Scientific and technical center of Nuclear regulation Commission of Russian Federation (SCNRC of Russian Federation), Moscow
- Experimental designer office "Hydropress" (OKB "Hydropress"). Podolsk, Moscow district.
- The Russian centre of science "Kurchatov institute" (RNC KI), Moscow
- Electrogorsky research center of All-Russia scientific research institute of NPP, Electrogorsk, Moscow district.

The unique equipment

- Complex of the measuring and analyzing equipment for the control of vibrations of the corporation "Bruel and Kier"
- Analytical simulator for NPP with WWER-1000
- Under critical uranium – water installation
- Thermal hydraulic-corrosion installation

ITPE DEPARTMENT OF ENGINEERING THERMOPHYSICS

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and 9 Ph.D. students

Head of Department:
Valentin G. SVIRIDOV
Dr. Sci. (Tech.), Prof.

Main Lines of Research

Research supervisors

- **Theoretical and experimental investigation of two-phase flow hydrodynamics and heat transfer at boiling of single-component liquids and binary mixtures**

  Prof. V.V. Yagov
- **Investigation of thermophysical properties of substances in a wide range of state parameters**

  Prof. V.V. Makhrov
- **Development of reference data on thermophysical properties of chemically reacting gases. Non-equilibrium system thermodynamics**

  Prof. A.M. Semenov
- **Development of physical models and numerical simulation of processes in plasma acted at constant electric and variable electromagnetic fields including in heterogeneous plasma with solid or liquid phases. Investigation of Steam Explosion Mechanism at Elevated Heat Fluxes**

  Prof. O.A. Sinkevich
- **Hydrodynamics and heat transfer in a turbulent flow of liquid-metal heat carrier in magnetic fields**

  Prof. L.G. Genin
- **Development and creation of automated systems for thermophysical researches, tests, control, and diagnostics**

  Prof. V.G. Sviridov
- **Experimental investigation of heat irradiation and water and water solutions boiling mechanism**
- **Investigation of Heat Transfer Enhancement in Steam Generating Channels**

  Prof. Yu.A. Kuzma-Kichta
- **Investigation of Thermophysical Properties of Subcooled and Equilibrium Water of Various Isotope Modifications**
- **Calculation of the Dissociation Constants for Salts in Superheated Steam**

  Prof. S.N. Smirnov
- **Development of mathematical models, algorithms, universal software (ANES) and numerical modeling of complex heat-and-mass transfer processes in components of power equipment**

  Assoc. Prof. G.G. Yan'kov
- **Investigation of ozone-safe substances: thermal-physical properties, thermodynamic cycles, and technological characteristics**

  Assoc. Prof. E.E. Ustyuzhanin
- **Experimental investigations of heat transfer intensification methods at condensation of pure vapor, vapor, and vapor-gas mixtures**

  Assoc. Prof. Yu.B. Smirnov

- **Methods and means of automated combined diagnostics of power engineering installations**

Assoc. Prof. V.I. Miroshnichenko

Agreements, Contracts, Projects Supported by State Budget

- Heat transfer mechanism investigation at mixtures boiling and condensing
- Physical Models and a Procedure for Predicting Heat Fluxes and Boiling Crisis in Binary Mixtures of Liquids and Salt Solutions
- Investigation of Heat Transfer and Transition Between Thermohydraulic Regimes for a Two-Phase Flow at Particle Fuel Elements backing
- Investigation of Flotation of Small Droplets with Large ones for Developing a Method for Removing Organic Phase Mictodroplets from Aqueous Phase
- Heat transfer investigation at low mass velocities and pressures as applied to evaporator of boiling type
- Investigation and intensification of heat transfer at boiling in forced motion
- Boiling process investigation using laser and acoustic diagnostics technique
- Heat transfer at vapor mixtures condensation in finned tubes
- Investigation of the energy and charge transfer processes in the Earth atmosphere as applied to ecological problems
- Plasma chemical processes for flue gas treatment
- Thermal-physics of non-equilibrium processes
- A fundamental equation of state for liquid and gas substances including the critical region, which are of engineering importance
- Hydrodynamics and heat transfer investigation in a liquid metals flow in a longitudinal and transverse magnetic field
- Experimental and theoretical study of turbulent flows in the mass forces field
- Development of transducers for local velocity and liquid and gas consumption measurements
- Scientific principles development for remote computer access to the advanced equipment of training laboratories for the engineering education system
- Studies of the combined effect of magnetic field and thermal-gravitation convection on hydrodynamics and heat transfer in liquid metals
- Automation systems development for experimental investigations
- Development of tools for supporting decision making on restoration of radioactive contaminated areas
- Development of the ANCOR-3D computer code and numerical modeling of the thermal-hydraulic and thermal-mechanical processes acting in WWER reactor cases at accident conditions
- Numerical modeling of heat and mass transfer in flying vehicles fuel cryogenic tanks
- Mathematical modelling of heat and mass exchange processes and power installations parameters combined optimization
- Combined investigation of physical-chemical processes in metal-hydride porous mediums and creation of the experimental system of hydrogen storage and cleaning for hydrogen energy conversion and accumulation systems
- Numerical modeling of heat and mass transfer in aircraft cryogenic fuel tanks and verification of the program code ANTANK
- Determination of the most thermal-loaded elements of the computer server complex by numerical modeling method

- Calculations performing of the hydro-steam turbines with different types of heat carriers
- Heat and mass transfer mathematical and numerical modeling in hydrogen accumulators with different hydrogen-absorbent alloys
- Heat and mass transfer mathematical and numerical modeling in hydrogen accumulators on the base of nano-materials
- Development of computer-laser refraction methods for investigation of non-stationary non-uniform thermal processes in liquid and gas flows of the power physical installations
- Heat and mass transfer phenomena in fine-dyspersated porous mediums
- Research of physical, chemical and thermal processes in hydro-metalic accumulators of hydrogen for equipment using renewed power resources
- Scientific and technology base creation for metal-hydride cleaning units design and for hydrogen accumulation for autonomous power installations
- Scientific school: «Physical Regularities of Heat Transfer in Evaporation and Boiling».
- Educational and Research Center «MPEI – The Institute of High Temperatures of the Russian Academy of Sciences» for Physical and Technical Problems in Power Engineering

Key Publications

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- An Experimental Investigation of the Development of Heat Transfer along the Tube Length under the Flow of a Liquid Metal Coolant in a Transversal Magnetic Field (in Russian). / L.G. Genin, V.G. Zhilin, Yu. P. Ivochkin, Ya.I. Listratov, N.G. Razuvanov, and V.G. Sviridov. Teploenergetika. 2004. V. 51. N. 3. P. 188-196.
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Patents

- Yu.A. Kuzma-Kichta and V.K. Belyakov, Heat Transfer Pipe, RF Patent No. 2221976, 2004.

Partners

- Technical University of Berlin, Germany
- Stuttgart University, Germany
- Riga Technical University, Latvia
- Shanghai University, China
- Tupolev Aircraft Scientific and Engineering Complex, Moscow
- Lomonosov Moscow State University (MGU), Chemical Faculty
- Kaluga Turbine Plant (KTZ), Kaluga
- Research and Production Association «Turbocon», Kaluga
- Institute for Safe Development of Nuclear Power Industry, Russian Academy of Sciences, Moscow
- Korean Institute of Power Engineering, Seoul, Republic of Korea
- Russian Scientific Center «The Kurchatov Institute», Moscow
- AOZT «CATI», Moscow
- State Gubkin Academy of Petroleum and Gas, Moscow
- All-Russian Research Institute of Nuclear Power Engineering (VNIIAM), Moscow
- Associated Institute of High Temperatures, Russian Academy of Sciences (IVTAN), Moscow
- Bauman Moscow State Technical University, Moscow
- State Research Institute of System Integration, Moscow
- Krasnoyarsk State Technical University, Krasnoyarsk
- Elektrogorsk Research Center for Safety of Nuclear Power Stations, Elektrogorsk, Moscow region
- Moscow Aviation Institute, Moscow
- «Kholodmash», Yaroslavl
- Agilent Technologies Co., USA
- National Instruments Co., USA
- Research and Production Association «Energomash», Khimki, Moscow region
- «Proton-Permskie Motory», Perm
- Research and Production Association NIIKhIMMASh», Peresvet, Moscow region
- State University of Low-Temperature and Food Technologies, Saint-Petersburg
- NIST – National Institute of Standards and Technology, USA

Unique Equipment

- Automated experimental facility for investigation of heat transfer in channels — a model of a reboiler
- Automated setup for investigation of heat transfer enhancement in channels with electronic heating
- Experimental desk for boiling investigation using laser and acoustic techniques.
- ANES – a system for automation of numerical experiments in the field of heat-and-mass transfer and liquid hydrodynamics
- Experimental mercury desk for investigation of hydrodynamics and heat transfer in liquid metal flow in a magnetic field
- Automated experimental setup for investigation of turbulence structure

- A Complex for Investigation of Spectral and Transport Properties (electric conductivity and thermal conductivity) of Atmospheric Low-Temperature Plasma
- Workstation for studying new information technologies

ITPE DEPARTMENT OF GENERAL PHYSICS AND NUCLEAR FUSION

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46 lecturers,
and 6 Ph.D. students

Head of Department:
Aleksandr T. KOMOV
Dr. Sci. (Tech.), Prof.

Main Lines of Research

Research supervisors

- **Experimental and theoretical investigation of electrons and light ions interaction with solid heterogeneous multi-component surfaces**
  Prof. V.P. Afanas'ev
- **Investigation of substances properties using optical-electronic methods**
  Assoc. Prof. Yu.I. Malakhov
- **Experimental and theoretical investigation of heat and mass transfer under phase transformation conditions with ultra-high energy density**
  Prof. A.T. Komov, Assoc. Prof. A.N.Varava
- **Quantum electrodynamics and quantum statistics.**
  Prof. Veklenko B.A.
- **Theoretical and experimental investigation of plasmatrons and plasma processes.**
  Prof. Nguen Kuok.Shi, prof. Chinnov V.F.
- **Development of computer technologies and their application into the teaching process and the laboratory training course**
  Prof. A.N. Sedov

Agreements, Contracts, Projects Supported by State Budget

- «Creation of science-technological preparation center for a nuclear fusion research and plasma research for young specialists».
- «The development of technologies for distane education and methods of their team using for engineers and science specialists».
- The investigation of film boiling mode in under-heated water flow».9
- On-line mode electronic spectroscopy for layered construction materials facing to high-temperature plasma.9
- The investigation of heat transfer regimes during impulse energy liberation in TVEL jacket.9

Key Publications

- *Afanas'ev V., Manukchin V., Fedorovich S.* Light ion spattering of the multilaminated surfaces (mirror effect) // Surface. 2003. .4 .31-37.
- *Lubenchenko A.* Angular distributions of charged particles and radiation // Surface. 2003. .4 .22-31
- *Afanas'ev V., Lubenchenko A., Gubkin M.* Quantitative interpretation of EELS and REELS spectra // Eur. Phys. J. B 37, 117-125 (2004).
- *Afanas'ev V.P., Lubenchenko A.V., Lukashevsky M.V.* Calculation for ion energy spectra reflected from layered solids. consecutive registration of energy losses fluctuations // Surface. 2004. .8 .23-27.

- ***A.T. Komov, A.N. Varava, A.V. Dedov and V.V. Yagov.*** Heat transfer regimes at subcooled water swirl flow. Proc. of the Third Intern. Symposium on Two-Phase Flow Modelling and Experimentation. Pisa, Italia, 22-26 September 2004. 1-8 p.
- ***A.T. Komov, A.N. Varava, A.V. Dedov, V.V. Yagov.*** CHF at subcooled water swirl flowboiling under one-sided heating. Proc. of the 4th European thermal scieces conference, 29th-31st March, 2004, Birmingham, UK. 1-7 p.
- *A.A.Belevtsev, V.F.Chinnov, E.Kh.Isakaev, A.V.Markin, O.A.Sinkevich.* On the peculiarities of the near-anode region in divergent channel plasmatrons. Progress in plasma processing of materials 2003. Ed. P.Faushais, Begell House, Inc., N-Y, pp. 225-230.
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- *B.A.Veklenko.* Macroscopic theory of 1/f noise in electric circuits (in Russian). Vestnik MEI. 3, 2003, p.63-68.
- *B.A.Veklenko., Yu.B. Sherkunov.* Non-classical charge fluctuations in electric circuits under thermal equllibrium (in Russian). Prikladnaya fisika. 4, 2004, p.5-17.
- *B.A.Veklenko., Yu.B. Sherkunov.* Failure of quantum Nyquist formula (in Russian). Proc. of the Seminar Noise and degradation processes in semiconducter devices. MNTORES Publisher, 2004, pp.11-17.
- *Nquen Kuok Shi.* Heat exchange investigation in welding arc (in Russian). Proc. of the II Intern. conf. Problems of energy safe. Heat exchange in electrothermal and torch furnaces. Tver. October, 2004, p.47-52.

Dions9

- Afanas'ev V.P. Interaction of electrons and light ions with non-uniform layered targets. Dr. Sc. (Phys.-Math.) Dissertation, 2003.
- The ions sources of Pt-Pd group investigation for electromagnetic isotopes separation.
- Sc. (Tech.) Dissertation, 2004.9

Partners

- Mstitute of Engineering Physics (MIFI), Moscow9
- nical Institute (MFTI), Moscow
- Bscow State Technical University (Bauman MGTU), Moscow9

- hnical University (SPbGTU), Saint-Petersburg
- Rcientific Center The Kurchatov Institute (RNTs KI), Moscow9
- clear Physics of the Lomonosov Moscow State University (NIIYAF MGU), Moscow
- e of High Temperatures Scientific Association, Russian Academy of Sciences (IVTAN), Moscow9
- tersburg
- Jtitute for Nuclear Research (OIYAI), Dubna, Moscow region.9
- The Dollezhal Research and Design Institute for Power Engineering (FGUP NIIKIET), Moscow
- Isical and Technical Institute, Saint-Petersburg9
- vestigation of Surface Properties, Moscow
- M Institute, Germany9
- , Tashkent, Uzbekistan
- Uuipment9
- igation of Material Properties Using the Spectroscopy of Reflected Electrons
- T for secondary ion mass-spectrometry9
- experimental facility
- W Polarization Probing9
- ion of the heat transfer crisis in nuclear fusion beam receivers designed for operation at the high density of the energy
- Tatic data acquisition system on the base of KAMAK standard and MEK 625.1 instrument interface9
- making models of composite specimens on the basis of polymer matrices using direct and alternating electromagnetic fields

INSTITUTE OF PROBLEMS IN ENERGY EFFICIENCY (IPEE)

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Departments of the Institute

- **Department of industrial heat-and-power engineering systems .....**
- **Department of high-temperature technologies energetics .....**
- **Department of industrial economics and of management enterprises .....**
- **Department of heat- and mass-transfer processes and facilities .....**
- **Department of chemistry and electrochemical power engineering .....**
- **Scientific-and-technical innovations center of energy-conservation technologies and equipment .....**
- **Research laboratory of global energy problems....**
- **Scientific-Research Department «Problems of control in the field of energy and resources saving» .....**

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The Departmenrt consists of:
24 lecturers
3 research assistants
9 Ph.D. students

Head of the Department
Dr.Sci. (Techn),
Corresponding Member of Academy of industrial ecology,
Prof. Vyacheslav A. RYZHENKOV

The main fields of scientific research

Research supervisor

- **Resource and energy saving in industrial, housing and communal service heat supply systems**

  Prof. Ryzhenkov V.A.
- **Analysis, investigation and rationalization of combined cycles based on usage of heat pump units and refrigerating plants. Effectiveness increase of industrial enterprises air-supplying systems**

  Prof. Kalinin N.V.
- **Reliability and operational efficiency increase of power engineering pump equipment**

  Assoc. Prof. Volkov A.V.
- **Scientific and technical basis of energy and resource saving increase in heat-and-power engineering nowadays**

  Prof. Abramov G.I.
- **Operation mode analysis of heat transformer (heat pumps and refrigerating plants)**

  Assoc. Prof. Martynov A.V.
- **Energy saving at industrial products manufacturing (high-performance thermal schemes, heat transfer enhancement)**

  Prof. Shelginsky A.Ya.
- **Mathematical modeling and energotechnological systems optimization of metallurgical plant on power and ecological criteria**

  Assoc. Prof. Sultanguzin I.A, Head of res. lab. Khromchenkov V.G.
- **Estimation of environmental effect according to Impact Pathway method**

  Assoc. Prof. Sultanguzin I.A
- **Energy audit and rationalization of heat-and-power supply systems of industrial enterprises**

  Head of res. lab Khromchenkov V.G.
- **Physical models of anisotropic turbulence. non-conventional and renewable energy sources**

  Prof. Motulevich V.P.
- **Heat-and-power supply systems for autonomous consumers using non-conventional energy sources**

  Assoc. Prof. Spiridonov A.G.
- **Computer-aided design systems in heat-and-power engineering units and systems**

  Assoc. Prof. Sakharov S.S.

Contracts, Agreements, Projects supported by State Budget

- Development of autonomous heat sources set for the heating and hot water supply
- Development of optimum heat-and-power supply system for the big industrial centre
- Complex heat exchange and renewable energy sources
- Resistance and heat exchange of subjects in liquid flow at mechanical influences
- Development of automated system of effective planning and control of operation modes of energotechnological system
- Development of cooling and heat systems for the industrial enterprises based on waste energy resources
- Heat-pumps in the energy supply systems
- Development of automated program-informational system of Cherepovets metallurgical industrial complex energotechnological system development planning and rationalization
- Development of energy-saving program and energy passports for industrial enterprises of Moscow and its region
- Estimation of environmental effect according to Impact Pathway method
- Correlation model of dynamic and thermal interaction of flows with the objects at presence of homogeneous and heterogeneous chemical processes
- Optimization of the heat-and-power supply systems of industrial enterprises based on power-ecological analysis
- Development of technical and economic method for the optimization of effective heat-and-power supply in Northern districts distant from central power supply systems (by the example of Yakutia)

Key publications

- Kalinin N.V., Papushkin V.N. and others. Pumps and blow units (Part 5) (in Russian). In reference book «Heat and nuclear power plants» under edition of Corresponding Member of Russian Academy of Sciences A.V. Klimenko and Prof. V.M. Zorin – third revised edition. MPEI Publisher. 2003 (Vol.3; Heat-and-power engineering and heat technology)
- V.V. Kuhartsev, A.G. Spiridonov. Comprehensive approach to power supply using non-conventional energy sources (in Russian). Proc. of the Conf. «Power and Energy saving as a factor of socio-economic development of regions in central federal district». MPEI branch in Smolensk. 2003. Vol.1. Pp. 55-58
- A.Ya. Yakovlev, A.G. Nikiforov. Neuron-systematic approach in selection of energy supply of the region (in Russian). Ibid, Pp. 68-71
- Kalinin N.V., Zharov D.V. Operation efficiency analysis of air-supplying systems and ways of its increase (in Russian). Vestnik MEI. 2003. №5. Pp. 110-113
- Sitas V.I., Sultanguzin I.A. Shomov P.A. , Yarunin S.N., Yashin A.P. Program-informational system «OptiMet» for energy and raw material resources management of metallurgical industrial complex. Vestnik MEI. 2003. №5. P. 114-119
- Gasho E.G. Degree of centralization, distribution and ways of rationalization of heat-and-power demand of territorial industrial complexes in Russia (in Russian). Vestnik MEI. 2003. №4. P. 34-39
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- Influence of Parameters of Installations Solar Heating on the Basic Indexes of System. A.N.Ratnikov and N.V.Kalinin. CONFERENCE INTERNATIONALE SUR L EFFICACITE ENERGETIQUE p.101.
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- Motulevich V.P. Solar Installations for Drying Agricultural Products. Int. Symposium in Renewable Energy. Kuala Lumpur, Malaysia, 14-17 sept. 2003.(CD-Rom.)
- Motulevich V.P. Air Conditioning by Means of Solar Installations. Reg. Conf on Energy Technology towards a Clean Environment. Phuket, Thailand 12-24 feb. 2003. (CD-Rom.).

Partners

- The university of France " Ecole de mine de Paris"
- Joint-stock company "Metallurgical industrial complex "Severstal"", Cherepovets
- Technical university of Dresden, Germany.
- University of Piza, Italy
- Armstrong International Inc., USA
- State Unitary Enterprise «MOSGORTEPLO»
- «Sigma», Czech Republic
- Open Joint-Stock Company «MOSENERGO»
- Open Joint-Stock Company «Unified Energy System of Russia»
- 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)
- «Teplo-technology»

- «Centroenergochermet»
- (Bauman's) Moscow State Technical University

The unique equipment

- The dual-purpose heat pump
- None adiabatic vortical pipe
- The expander with inner drive of valves
- System of decentralized heat supply based on vortical heat generator

DEPARTMENT OF POWER ENGINEERING OF HIGH-TEMPERATURE TECHNOLOGIES

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The department has on its staff
15 lecturers,
5 research workers,
and 10 Ph.D. students

Head of the Department
Cand. Sci. (Tech), Prof. Tatiana A. STEPANOVA

Main Directions of Research

Research supervisors

- **Development of new-generation process equipment such as diverse melting chambers (furnaces), high-temperature melting-and-reduction and melting-and-oxidation reactors, heating and heat-treating furnaces, heat generators, fuel-burner devices, and elements of regenerative and external heat utilization.**

  Prof. T.A. Stepanova

- **Development of conceptual trends of intensive energy saving in branches of industry based on the use of thermal technologies (ferrous and non-ferrous metallurgy, production of chemicals and mineral fertilizers, mechanical engineering, production of building materials, gas industry), using the method of maximal energy saving developed in the Power Engineering of High-Temperature Technologies Department of Moscow Power Engineering Institute**

  Prof. A.D. Klyuchnikov

- **Intensification of energy consuming efficiency in sulphide ores heat-technology processing**

  Prof. I. P. Morozov

- **Development, investigation, and test of new heat-engineering principles of realizing technological processes, structural and parametric optimization of thermal schemes of processing raw materials technological processes, heating and thermal treatment of blanks and articles**

  Sr. Researcher V.A. Tumanovskii

- **Development of energy-saving thermal schemes arid energy-saving process equipment for enterprises of chemical industry**

  Sr. Researcher V.A Tumanovskii

- **Optimization of regional fuel-and-energy balances**

  Prof. T.A. Stepanova

- **Development of energy-saving thermal schemes and energy-saving process equipment for the production of building materials**

  Assoc, Prof. Yu.V. Troyankin, Assoc. Prof V.N. Kuz'min

- **Auditing in power engineering of industrial enterprises, working out of measures aimed at improving fuel-and-energy balances of enterprises and at saving fuel-and-energy resources by way of profound modernization of thermal-technology systems used in the production of iron, steel, non-ferrous and rare metals, rolled stock, cement, glass, ceramic articles, mineral fertilizers**

  Prof. Morozov I. P., Sr. Researcher V.M. Smirnov

- **Raising the energy efficiency of high-temperature thermal -technology processes**

  Assoc. Prof B.A. Sokolov

- **Thermal-technology processing of solid fuels**

  Prof A.A. Belyaev
- **Raising the energy efficiency of high-temperature thermal-technology processes**

  Assoc. Prof B.A. Sokolov
- **Development of waste pyrorefining (combustion) plants**

  Assoc. Prof V.I. Volkov, Assoc. Prof V.A. Ippolitov, Prof T.A. Stepanova
- **Certification and other tests of gas and liquid-fuel burners and gas-utilizing equipment**

  Researcher V.M. Smirnov
- **Development of mathematical models of thermal-technology systems and complexes**

  Assoc. Prof S.K. Popov
- **Development of electronic textbooks, books of problems and other program means of teach applying**

  Assoc. Prof S.K. Popov

Agreements, Contracts, Projects Supported by State Budget

- Development of an energy-saving and environmentally clean thermal-technology system for continuous integrated processing of raw and slightly enriched iron ores, based on their high-temperature coke-free reduction by the products of thermal decomposition of natural gas
- Development of an energy-saving thermal-technology system for waste-free processing of sulfide-ore concentrates to blister copper with extraction of sulfur and iron, that would make it possible to realize continuous melting of charge with subsequent reduction treatment of the melt
- Development of an energy-saving thermal-technology system for processing of flaming metallurgical slag to molten cement clinker
- Development of cyclone-type energy-technology units for hydro-thermal processing of phosphate stock to mineral fertilizers and fodder additives
- Development of skull cyclone-type glass-making furnace for high-module charges boiling in systems of liquid glass manufacture based on sulfate and soda technologies
- Development of a gas furnace for inflating oxidation graphite
- Auditing in power engineering of enterprises in the construction and chemical industry
- Development of automatic systems of NOr suppression in metallurgy
- Elaboration of a facility for pyrorefining of liquid and paste-like industrial waste
- Development of standards, methods, and equipment for certification testing of gas-utilizing equipment

Key Publications

- Popov, S.K., Mathematical Model of Melting of a Moving Hollow Cylinder under Conditions of a Melting Chamber with a Perforated Bed (in Russian), Vestnik MEI, 2002; no. 3, p. 56.
- Klyuchnikov A.D. Power engineering of technology is an absent fundamental link in the structural scheme of power engineering (in Russian), Vestnik MEI, 2003; no. 5, pp. 104-109.
- Troyankin Yu.V., Fuel economy by means of the industrial furnaces regenerators reconstruction (in Russian). Promishlennaya energetica,2003, no. 12 , pp. 22-25.

- Troyankin Yu.V., Kukoleva O.V. Ecological modernization of heating-and-industrial boiling-house on instance of TEC MEI boiler no. 2 (in Russian). Vestnik MEI, 2003; no. 2, pp. 15-18.
- Belyaev A.A., Yampolsky Y.P., Strannikova L.E. Membrane air separation of intensification of gasification process. Fuel Processing technology, 80 (2003), pp. 119-141.
- Popov S.K., Mathematical model of regenerative burner heat work.(in Russian) –Proc. of the Intern. conf. "Efficient using gas in metallurgy", 13-14 November 2003, MIiS, OOO VNIIPromgaz Publisher, centre "Energomet", p. 128-129.
- Lopatin M.U., Morozov I.P. Defining energy saving potential and the ways of realizing them in heat-technology complex of processing sulfide ores (in Russian). Ibid, p. 128-129.
- Ovchinnikov I.A., Klyuchnikov A.D., Raising of metallurgy factory energy efficiency by means of using slag and producing by-product (in Russian). Ibid. p. 124-125
- Pargunkin K.E., Smirnov V.M., Morozov I.P., Tumanovskii V.A., Koritin U.A., Reznikov A.D., Zvyagincev N.K. Applying of silicon carbide for burners working in the conditions of high temperatures (in Russian). Ibid, p. 135-136.
- Bernadiner M.N., Bernadiner I.M. The analysis of thermal neutralization medical wastes problem (in Russian). Proc. of the 3rd World congress on ruling wastes. Waste Tech – 2003, Moscow, July 3-6, p. 171

Our Partners

- All-Russia Research Institute of Chemical Industry (VNHKhT), Moscow
- Promotkhody (Industrial Waste) State Enterprise, Moscow
- Fertilizer and Fungicide Research Institute (NIIUIF), Moscow
- NPO Tekhenergokhimprom scientific-and-production association, Moscow
- RAO Gazprom company, Moscow
- DOAO Promgaz company, Moscow
- Center of Introduction of New Technologies of the Ministry of Railways Transport of the Russian Federation, Moscow
- Energotekhmontazh commission-and-adjustment directorate, Moscow

Unique Equipment

- 1-MW/ test bed for certification testing of gas-burner devices and gas-utilizing equipment
- Cyclone-converter process reactor designed for effective realization of melting, melting-and-oxidation, and melting-and-reduction processes with natural mineral materials and charges subjected to thermal-technology treatment in high-temperature vortex suspension of matter in gas, in a film of melt, and in a convector bath operating in an active hydrodynamic mode
- Revolving-fluidized-bed reactor designed for pyrorefming of a wide range of solid and paste-like waste
- Cyclone reactor for pyrorefming of highly concentrated toxic sewage containing organic and mineral substances
- Gas-fired heating chamber furnace for the investigation of processes of heating and thermal treatment of articles and blanks of metal, ceramic, and other materials
- Straight-line furnace with variable characteristics of radiating flame and geometry of the working chamber for the investigation of heat transfer and testing of the means for special measurements, equipped with an automated research system enabling one to use mathematical methods of planning experimental investigations

- Cyclone-type firing stand designed for pyrorefinrng of liquid industrial waste and for testing burner devices of new types, including gas-oxygen burners for industrial applications
- Through-flow-vortex reactor with a fluidized-melt bath
- 30-kW electric generator with a gas-turbine

DEPARTMENT OF INDUSTRIAL ECONOMICS AND MANAGEMENT

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The department has on its staff
42 lecturer
23 Ph.D. students

Head of the Department
Dr. Sci. (Techn),
Professor, Nicolay D. ROGALEV

Major areas of Research and Development

Scientific Advisers

- **Innovation complex infrastructure development. Development of legal standards and methodical basis in the field of scientific-innovative activities in educational systems.**
  Prof. N.D. Rogalev
- **Development of evaluation methods for economic effectiveness of investment projects.**
  Prof. N.D. Rogalev
- **Economic and management problems of energy-saving in power engineering, industry, and housing and communal services.**
  Prof. N.D. Rogalev
- **University technological transfer and technologies commercialization.**
  Prof. N.D. Rogalev
- **Methodological issues of strategic planning for industrial enterprises.**
  Prof. N.D. Rogalev
- **Intellectual property management: economic and legal issues.**
  Prof. N.D. Rogalev

Industrial R&D Contract, Grants, Projects financed by Government

- Carrying out models and methods of industrial costs forming and electrical energy transfer, produced by heating and power plant and boiler-house;
- Investigation of economical perspectives of exploitation term prolongation of nuclear power station first and second generation;
- Carrying out automatized information system of dissertations in Russia.

Key Publications

- Rogalev N.D., Gasho E.G., Koval A.V. About results of demo zone of energetic effectiveness creating and perspectives of energy and sources saving in municipal complex of the city (in Russian). Energosberezhenie. №1.2003, pp. 2-7.
- Rogalev N.D., Baydakov S.L. About the complex territorial approach to energetic effectiveness increasing of city's municipal economy.// Energy-saving № 1 – M. 2003 .
- Rogalev N.D., Pavlovetc V.I., Lebedev I.P., Habalova N.L. The valuation of scientific and technical meaning of innovation projects (in Russian). Economika i kommertsia, № 1-2. 2003, pp. 123-131.
- Rogalev N.D., Pavlovetc V.I., Lebedev I.P., Habalova N.L. The forming of innovation complex infrastructure as a process of innovation management (in Russian). Economika i kommertsia, № 3-4. 2003, pp. 55-59.

- Rogalev N.D., Zubkova A.G., Shandruk D.A. Carrying out the system of strategy marketing for companies in chloric field (in Russian). Ob'edinionnyi nauchnui zhurnal, № 22. 2003. P. 28.
- Rogalev N.D., Binkin B.A., Zubkova A.G., Shandruk D.A. The evaluation of new products application projects effectiveness in chloric field taking into account risk factors (in Russian). Ekonomika i finansy, № 19. 2003, p. 40.
- Rogalev N.D, Kurdukova G., Fedorov E., Fedorov D. Perspectives of developing of small energetic using steam turbine with back pressure on the base of private investment in Russia. // Journal « The bulletin of MPEI»№ 5.- M. 2003.
- Rogalev N, Challenges and Barriers of Technology Commercialization in Russia.// SYSTEMS AND POLICIES FOR THE GLOBAL LEARNING ECONOMY (PART III: Chapter 17. Edited by David V.Gibson, Chandler Stolp Pedro Conceicao, and Manuel V. Heitor // International Series on Technology Policy and Innovation. Quorum Books, Westport, Connecticut. London, 2003.
- Rogalev N.D., Prohorov V.B., Kurdukova G.N., Khatuntseva N.B. The Investigation of air pollution by heat energy plant emission and auto transport emission in Moscow (in Russian). Teploenergetika, 2003, no.12, pp. 2-7.
- Vyalkova A.I. Reference points to transformation of the Russian civilization (in Russian). Proc. of the Intern. conf. «St. Petersburg within dialog of civilization and cultures of East and West», St. Petersburg, 2003, pp.150-153.

Dissertations

- Fedorov E.V. «Private property as a factor of enhancement of electric power production efficiency using of low and medium power turbines». *Cand. Sci. (Techn) Dissertation*, 2003.
- Maslov A.N. «Enhancement in corporate informational systems implementation of organization and management in consulting activities for businesses». *Cand. Sci. (Techn) Dissertation*, 2003.
- Andryushin D.A. «Enhancement of financing of electric power regional complex system development, based on capital attraction « *Cand. Sci. (Techn) Dissertation*, 2003.
- Shandruk D.A. «Enhancement of strategic planning system for enterprises of chlorine sub-industry» *Cand. Sci. (Techn) Dissertation*, 2003.
- Fedorov D.V. «Leasing as the new economic direction for development of small and alternative power engineering» *Cand. Sci. (Techn) Dissertation*, 2003.
- Musaeva D.E. Strategic planning of enterprise development on the base of economical methods of products quality control. *Cand. Sci. (Techn) Dissertation*, 2004.

Partners

- Unified Energy System of Russian RAO «EES Russia»
- Science Park of MPEI
- «ESCOTECH» Ltd.
- «TURBOKON» Ltd.
- Ulan Bator University, Ulan Bator, Mongolia
- Russian-Chinese Techno park «Friendship»

IPEE DEPARTMENT OF HEAT- AND MASS-TRANSFER PROCESSES AND FACILITIES

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The department has on its staff
22 lecturers
and 12 Ph.D. students

Head of Department:
Yurii G. NAZMEEV
Corr.-member of Russian Academy of Sciences
Dr. Sci. (Tech.), Prof.

Main Lines of Research

Research supervisors

- **Steady-state and non-steady-state two-phase heat transfer and hydrodynamics. Heat transfer under conditions of liquid film boiling**
  Prof. Yu.M. Pavlov
- **Development of calculation methods for heat and mass transfer while drying moist materials and the drying facilities optimization. Energy saving in industry**
  Prof. O.L. Danilov
- **Numerical simulation of non-steady-state processes of hydrodynamics and heat transfer under conditions of turbulent flow of incompressible and compressible liquid in channels. Development of models of turbulent transfer of momentum, heat, and mass under conditions of free thermoconcentration convection**
  Prof. E.P. Valueva
- **Calculation of characteristics of single-phase heat transfer and friction in pipes, channels, and objects of various shapes**
  Prof. E.D. Sergievskii
- **Investigation of transfer processes in industrial apparatuses with physical and chemical transformations and of the impurities propagation in the atmosphere**
  Assoc. Prof. A.B. Garyaev
- **Development the thermal energy saving methods at industrial enterprises. Thermal cleaning of industrial sewage of organic and inorganic impurities. Methods of heat transfer enhancement**
  Prof. A.L. Efimov
- **Development, investigation, and modeling of systems elements for maintaining the thermal conditions of autonomous objects and climatic plants**
  Assoc. Prof. V.Ya. Sasin

Agreements, Contracts, Projects Supported by State Budget

- Development of software package and methods for improving the professional skill of specialists in educational institutions in the sphere of energy conservation
- Development of methods for calculation of recuperative and direct-contact heat exchangers for steam-gas mixtures
- Development of an academic complex for training in «Energy saving in power industry and technologies»
- Development of scientific principles of energy conservation for thermal-technology facilities with non-uniform heat and mass transfer
- Investigation and optimization of the drying kinetics in facilities for drying dispersed liquid and solid materials

- Investigation of heat transfer and resistance in an non-steady-state turbulent flow of compressible liquid in a channel under conditions of resonance oscillation of the flow rate
- Physical and computational modeling of thermohydraulic processes
- Development of a physical model of critical liquids boiling in channels in the region of high reduced pressures
- Investigation of features of heat transfer and flow in a pulsating turbulent stream of compressible gas
- Investigations of turbulent structure and heat and mass transfer for developing special equipment

Key Publications

- Papers
- Sergievsky E. D., Homchenko N.V. Computing local characteristics during water evaporation from the insert placed in the center of the channel (in Russian). // Promishlennaya teplotehnika, 2003, v. 25, №4, P.441-443.
- Veisi F., Sergievsky E. D. Dynamic modeling of the heat regime of the building using Matlab/Simulink (in Russian). // Promishlennaya teplotehnika, 2003, v. 25, №4, P.373-374.
- Efimov A.L., Yakovlev I.V., Guschina G.I., Gerasemchuk V.E. A potential and problems of energy saving in educational institutions of Moscow (in Russian). // Energosberegenie, special Journal №4, 2003.
- Kulik A.A., Valueva E.P. Attenuation of the pressure wave in the pulsating turbulent flow of compressible liquid in a tube (in Russian). Proc. of the XIV school-seminar of young scientists and specialists under the directions of the member of RAS Leont'ev A.I., 2003, v. 1, P. 41-44.
- Kulik A.A., Valueva E.P. Dynamic characteristics of the pulsating turbulent flow of compressible gas in a tube under the influence of the average flow in time (in Russian). Teplofisika visokikh temperatur, v. 1, №3, P. 415-421.
- Kulik A.A., Valueva E.P. The coefficient of the pressure waves attenuation under pulsating turbulent gas flow in the channel (in Russian). Teplofisika visokikh temperatur, v. 41, №4, P. 415-421.
- Sergievsky, E. Veysi F. A simple thermal modeling of solar collector by using mathlab/simulink // International Conference for energy and environment, 2003, pp. 32-37.
- Ovchinnikov E.V., Zhdanov I.L., Haustov A.I, Sergievskiy E.D. Computing the current of liquid in the channels of vortical pump (in Russian). Vestnik MAI, MAI Publisher, 2003, v. 10, №2, P. 44-47.
- O.L. Danilov, S.I. Konovaltsev, S.Yu. Shuvalov. The Numerical Modelling of non-Uniform Mass Transfer, Convective and Radiant Heat Transfer and Energy Saving Operations in Solar-Energy Driers / Proc. of 1ere Conf. Intern. sur L'efficacite Energetique. Alger. 25-26 Mai 2003. V 2. PP.67-70.
- O.L. Danilov, B.I. Leonchik. Energy at the Time of Hydrothermal Processing of Agricultural Raw Material. Ibid, Pp.111-115.
- Garyaev A.B., Tseplyaeva E.V. Computing the humid gas utilization of the heat in the cross current heat exchangers (in Russian). Vestnik MEI, №5, 2003, P. 82-85.
- Garyaev A.B., Danilov O.L., Efimov A.L., Yakovlev I.V. Development of the case studies for qualification improving of the universities employees in the area of energy saving technologies (in Russian). // Proc. of the scientific-practical conf. of energy saving / Smolensk, 2003, v.1.

- Danilov O.L., Kovalenko A.P., Stephansev A.M. Influence of heat and mass transfer processes on the accuracy of determination of the heat loss through the walling (in Russian). Ibid.
- Danilov O.L., Shapovalova G.P., Shuvalov S.Yu. The influence of the kinetic non-uniformity on the output of the waste energy in the heat-technology devices (in Russian). Ibid.
- Maskinskaya A.Yu., Sergievskiy E.D. The experimental study of the surface temperatures using the thermal imager (in Russian). Ibid.
- Moskalenko I.V., Danilov O.L. Optimizing the non-uniform heat and mass transfer in the drying devices of the spraying (in Russian). Ibid.
- Zakharov S.V., Pavlov Yu.M. A method of CHF computation in bubble boiling in channels (in Russian). Teploenergetica. 2004. No3. p.72-77.
- Zakharov S.V., Pavlov Yu.M. Critical heat flux at the slug flow regime (in Russian). Proc. of the conf. «Actual problems of thermal physics and physical hydraulic gas dynamics.» 2004, September 20 – 26, Alushta.

Dissertations

- Zakharov S.V. The model of the heat transfer crisis during the bubble boiling of the liquids in the channels at high normalized pressure.
- Veisi Farzad. Non-stationary processes in the system of sun-powered heating of buildings.

Partners

- Paris Higher School of Arts and Crafts, Paris, France
- University of Pisa, Pisa, Italy

Unique Equipment

- Measuring complexes for automatic data acquisition in the process of thermophysical investigations
- Climatic chamber of thermal-and-moisture treatment of air for testing refrigerationand-drying units
- Hot-wire anemometers manufactured by TCA (USA) and Dantec Electronic (Denmark)

IPEE DEPARTMENT OF CHEMISTRY AND ELECTROCHEMICAL POWER ENGINEERING

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The department has on its staff
20 lecturers,
4 research workers,
7 engineers,
and 10 Ph.D. students

Head of Department:
Nikolai V. KULESHOV
Cand. Sci. (Tech.), Assoc. Prof.

Main Lines of Research

Research supervisors

- **Research and development in the fields of hydrogen manufacturing, storage and usage**
  Assoc. Prof. N.V. Kuleshov
- **Development of novel energy-intensive rechargeable current sources**
  Prof. N.V. Korovin
- **System analysis and optimization of electrochemical power plants**
  Prof. B.P. Nesterov
- **Development of lithium current sources**
  Assoc. Prof. S.E. Smirnov
- **Development of current sources of new generation for autonomous objects supplying**
  Assoc. Prof. B.I. Adamson
- **Applied fuzzy systems**
  Assoc. Prof. D.G. Naryshkin
- **Development of instruments for monitoring the composition of aqueous heat-transfer agent**
  Sr. Researcher S.I. Nefedkin
- **Development of methods and equipment for reducing the internal corrosion of intrafield oil pipelines**
  Prof. N.V. Kuleshov
- **Spectrochemical diagnostics of electrochemical materials**
  Assoc. Prof. N.A. Yashtulov

Agreements, Contracts, Projects Supported by State Budget

- Development and investigation of a lithium-polymeric rechargeable cell
- Heat and mass transfer in electrochemical power plants
- Research and development of the promising current sources
- Fuel sells
- Development of an electrolyzer for hydrogen-oxygen treatment of materials

Key Publications

- Kuleshov, N.V., Grishin M.L. and Albantov A.F., Main aspects of ampere-valumetric sensors for hydrogen (in Russian). Avtonomnaya energetika, 2003, no 16, p. 39-50
- Korovin, N.V., Chemical Power Sources: Current Status (in Russian). Elektrokhimicheskaya Energetika, 2003, vol. 3, no. 4, p. 163-169

- Smirnov, S.E., Zhorin V.A., Sivtchov A.V., etc. Investigation of structure and electrochemical properties of lithium manganese oxide (in Russian). Electrokhimia, 2003, v.39, no 3, p. 276-282
- Nefedkin C.I., Alkhimov V.I., Modeling of mass transfer process during electrochemical purification VTS in circuit technologies systems (in Russian). Vestnik MEI, 2003, no 4, p.86-91
- Adamson B.I., Agafonov D.N., Feasibility study of resource increasing of Mn-Zn elements with saline solution (in Russian). Estestvennie and Tekhnicheskie Nauki, 2003, no.6, p. 58-62
- Patents
- Smirnov, S.E., Zhorin V.A. and Ogorodnikov A.A., Manufacturing method of cathode active mass for lithium accumulator, RF Patent № 2230399, 30.05.2002., BI №16, 2004, 5 p.

Partners

- Kurchatov Institute Russian Scientific Center, Moscow
- Energiya Rocket-and-Space Complex (RKK Energiya), Korolev, Moscow Region
- Institute of Electrochemistry, Russian Academy of Sciences (IEL RAN), Moscow
- Institute of Chemical Physics, Russian Academy of Sciences (IKhF RAN), Moscow
- Institute of Organoelemental Compounds, Russian Academy of Sciences (IEOS RAN), Moscow
- Al'tern scientific-and-production association (NPO Al'tern), Elektrougli, Moscow Region
- Energomag State small-scale scientific-and-production enterprise (GMNPP Energomag), Moscow
- Lomonosov Moscow State University (MGU), Moscow
- University of Vienna, Vienna, Austria
- Center for Solar and Hydrogen Power, Ulm, Germany

Unique Equipment

- Kvant-Z.ETA spectrometer
- Specord M-80 IR-spectrophotometer
- LF-41 impedometric facility
- BIP-15 vacuum deposition facility
- Attachment unit for the «Artificial Kidney» apparatus

SCIENCE TECHNICAL INNOVATION CENTER OF ENERGY EFFICIENCY TECHNOLOGIES AND TECHNIQUES (STIC EETT)

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The Center has on its staff
24 research workers
and 21 engineers

Director of STIC EETT
Ph.D., Assoc. Prof.
Anatoliy G. VAKULKO

Main Fields of Research

Research Managers

- **Fundamentals of Energy Saving**
  Assoc. Prof. Vakulko A.G.
- **Formation methods Of Energy Saving Information Analytical Systems**
  Assoc. Prof. Bobryakov A.V.
- **Energy Audit Approaches**
  Assoc. Prof. Zlobin A.A.
- **Development of system for Energy Parameters Monitoring**
  Sr. Researcher Makarychev P.K.
- **Science Foundations Of Gas Expander Unit Application In Gas Supply Systems**
  Prof. Agababov V.S.

Contracts and Projects Supported by State Budget

- Energy consumption limitations development for academic buildings and structures
- Development of the Information portal for the Program «Energe saving at Ministry of Education of the Russian Federation».
- Development of the software complex for the information-analytic system of energy certification and the universities passport system
- Development of normative documents and the software for organization and functioning of «Energy Bureau of educational institutions»
- Development of principles and algorithms for up-to-date program-modular energy parameters measurements required for the Energy Bureau of education institutions operation.
- Development of methods and software elements for an information analytic system «Monitoring the Save Energy Branch Program realization of Russian Ministry of Education».
- Development of branch information system for collection and analysis of statistic data on energy consumption efficiency by using XML – techniques.
- Development of a estimated models for save energy and resource activities of education institutions.
- Renewable and non-traditional energy and heat source usage for education institution energy supply.

Key Publications

- Vakulko A.G., Zlobin A.A., Romanov G.A. Price Setting Problems In Energy Surveys (in Russian). Energosberezhenie, N 3, 2003. Pp. 67-69.

- Zlobin A.A., Kuryatov V.N., Maltsev A.P., Romanov G.A. Energy savings Potential And Its Practical Realization (in Russian). Energonadzor i energoeffektivnost, N3, 2003. Pp. 76-81.
- Ziborov B.N., Tolcheyev O.V., Frolov N.M., Dolbenko E.V., Shpenikov A.V. Operation Singularity Of Energy Equipment Of Mosvodokanal Water Stations. Energy Manager, N29/30, 2003.
- Zlobin A.A., Kuryatov V.N., Maltsev A.P., Romanov G.A. Foundation development Of Branch Complex Programs Of Rational Use And Energy savings (in Russian). Energeticheskaya politika, N4, 2003. Pp. 17-20.
- Ziborov B.N., Karasyov U.A., Medvedeva I.U. Save Energy savings Branch Programs And Energy Surveys Role In Their Formation (in Russian). Energeticheskaya politika, N4, 2003. Pp. 21-28.
- Zlobin A.A., Kuryatov V.N., Maltsev A.P., Romanov G.A. Energy savings Basic Concepts At Ferrous Metallurgy Enterprises (in Russian). Energeticheskaya politika, N4, 2003. Pp. 29-35.
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- Zlobin A.A., Kuryatov V.N., Maltsev A.P., Romanov G.A. Energy savings features at Cold Supply Systems (in Russian). Energosluzhba predpriyatia. N 5, 2004. Pp. 40-41.
- Agababov V.S. Gas Heat In An Expander Generator Unit By Leaving Flue Gas Of A Power-Generating Boiler. Save Energy And Water Preparation, p.46-47, N3, 2003.
- Expander Generator Unit Field Experience At co-generation power station TEC-21 of «Mosenergo» Company (in Russian). Elektricheskie stanzii, No. 10, 2003, pp. 15-17. Agababov V.S., Gus'kov U.L., Koryaghin A.V. and others.
- Compare Of Gas Heat Various Technique In Expander Generator Units Of Heat Stations. Agababov V.S., Koryaghin A.V., Juraeva E.V. and others. Bulletin Of MPEI, p. 101-103, N5, 2003.
- Compare Of Gas Heat Various Technique In An Expander Generator Unit (in Russian). Agababov V.S., Koryaghin A.V., Juraeva E.V. and others. Teploenergetika, , pp. 46-50, N11, 2003.
- Agababov V.S., Koryaghin A.V., Juraeva E.V. Heat Pump Unit Use For Gas Heating Before An Expander. (in Russian). Energosberezhenie i vodopodgotovka. p.39-41, N1, 2004.
- Agababov V.S., Koryaghin A.V., Andreyev A.R. Boiler-House Characteristics Change Due To Gas Expander Unit Use. Industry Power Engineering, p. 38-44, N7, 2004.
- Agababov V.S., Koryaghin A.V. Electricity Generation By An Expander Gas Unit Under Concurrent Heat Supply Of Various Temperature Levels (Heat And Cold). Promyshlennaya energetika, pp. 46-48, N8, 2004.
- Bobryakov A.V., Klimenko A.V. Effective Energy Resource Consumption Monitoring At Budgetary Financed Plants. Energy Policy, N2, 2004.
- Klimenko A.V., Frolov Yu.N., Vakulko A.G. etc. Energy resourses usage effectiveness monitoring at the objects financing from the federal budget (In Russian). Energeticheskaya politika, 2004. No. 2, pp. 35-43.

Partners

- Federal Agency Of Education (FAE).
- Business Accounting And Fiscal Control Board Of FAE.
- State Energy Inspection Department of Russian Energetics Ministry.
- Logistical Support Department of Russian Ministry of Education, Moscow.

- Administrative Economy Department of Russian Ministry of Education, Moscow.
- State Energy Inspection Administrative Department in Moscow – Mosgorenergonadsor.
- Ministry of Science and Industry of Russia.
- Corporation «Expocenter».
- Corporation «Kaluzchskaya Brewing Trade Company».
- Pipe Metallurgical Company.
- Russian Ministry of Transport.
- Corporation «Krasnodarskiy Butter and Fat Industrial Complex».
- Energy Commission of Moscow Region.
- «Gazpromenergo» ltd.
- Joint-Stock Company «Mosenergo».
- Moscow State Unitary Enterprise (MSUE) «Mosvodokanal».
- Central Bank of Russia.

Unique Technique

- Set of computed meter complexes and instruments for instrumental surveys of municipal economy objects and industry works. The Energy Bus of MPEI.
- Complex technique for energy and ecological surveys and auditing including ones for inspection of power consumption, electricity quality as well as fuel and energy resource flow meters, gas concentration meters of CO, CO2, SO8, NOx, O2, benzopren and others.
- Soft and hardware of the information analytical system of Russian Ministry of Education including methodical software.
- Soft and hard ware of the information analytical system of State Energy Inspection departments of Russian Ministry of Energetics.

IPEE RESEARCH LABORATORY OF GLOBAL ENERGY PROBLEMS

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5 research workers
and 1 Ph.D. student

Head of Laboratory
Vladimir V. KLIMENKO
D. Sc. (Tech.), Prof.

Main Fields of Research

- Studies of the regularities of the world energy development
- Study of the environmental aspects of the development of various spheres of human activities, in particular, the evolution of environmentally benign technologies in the production and consumption of different forms of energy
- Study of the anthropogenic impact on the atmosphere: reconstruction of the time series of the greenhouse gases and pollutants emission in various branches of the world and Russian economy, development of scenarios of possible man's impact on the chemical and radiative thermal balance of the atmosphere, and the investigation of the possible ways of reducing such negative impact
- Modeling and prediction of climatic changes on global and regional scales, in particular, an identification of the anthropogenic contribution to the evolution of the main climatic characteristics
- Study of feedbacks in the «man-climate» system: general assessment of the consequences of possible climate change for various spheres of human activity, study of the processes in some spheres of economics (power industry, systems of heat supply, objects of nuclear industry, construction industry), development of new approaches to minimizing the negative consequences of the expected changes of natural environment and climate for the Russian economy
- Investigation of past climates and their relation to the evolution of civilization: palaeoclimatic studies (reconstruction of past climates using palynological, dendrochronological, historical and other methods).
- Contracts and Projects Supported by State Budget
- Development of estimation methods for the anthropogenic emission of methane and nitrous oxide in the territory of Russia
- Assessment of the pollutants emissions reduction potential in energy sector as a result of non-conventional and renewable energy sources development
- Prospects of Russia's power industry as regards to the implementation of Kyoto Protocol decisions
- Assessment of anthropogenic greenhouse gases and pollutants emission in the territory of the former USSR during the period of 1950-2000
- Energy and expected changes of climate. Short-period factors and long-term trends
- Energy and expected changes of climate. Regional trends and climatic characteristics
- Investigation of climatic aspects of the reliability of nuclear industry objects in the territory of Russia
- Development of prognostic estimation methods of the natural environment and climate change in the areas of radioactive wastes disposal

- Developing prognostic estimates of regional climatic parameters for optimizing the operation of objects of RAO EES Rossii (Unified Power System of Russia)
- Prediction of climatic changes in the territory of the Republic of Tatarstan for the period until 2010

Major Publications

- V. V. Klimenko, V. A. Klimanov, A. A. Sirin and A. M. Sleptsov. Climate Change in the Western Part of European Russia during the Late Holocene, Dokl. Earth Sciences, 2001, Vol. 377, No. 2, P. 190–194.
- V. V. Klimenko. Global Warming and Energy: Myths and Reality (in Russian), Energy, 2001, No. 5, P. 16–24.
- V. V. Klimenko, A. V. Klimenko and A. G. Tereshin. Power Engineering and the Climate on the Eve of the New Century: Forecasts and Reality, Thermal Engineering, 2001, Vol. 48, No. 10, P. 854–861.
- V. V. Klimenko. Climate of the Medieval Warm Epoch in the Northern Hemisphere (in Russian), MPEI Publisher, 2001.
- V. V. Klimenko, V. V. Dovgalyuk and O. V. Mikushina. Moscow Region Climate Forecast under the Influence of Anthropogenic and Natural Factors (in Russian), Vestnik MEI, 2001, No. 2, P. 36–45.
- V. V. Klimenko. Monitoring of the Dynamics of Global Climatic Processes (in Russian), Proc. of the Intern. Conf. «Mathematical and Physical Methods in Ecology and Environmental Monitoring», Moscow, MGUL Publisher, 2001, P. 43–53.
- A.G. Tereshin. Environmental Issues of the Russian Energy Strategy (in Russian), MPEI Bulletin, 2001, No. 5, P. 72–79.
- V. V. Klimenko, O. V. Mikushina. Changes in Climate and Natural Environment in Northern Russia in the First Half of the 21st Century (in Russian), Energy Policy, 2001, No. 5, P. 35–42.
- V. V. Klimenko, D. A. Larin and O. V. Mikushina. Temperature Trends of Taimyr Region and Global Climate Change (in Russian), Geoecology, 2001, No. 3, P. 195–203.
- V. V. Klimenko, A. V. Klimenko, A. G. Tereshin and O. V. Mikushina. Changes of the Heating Season Parameters in the European Russia as a Result of Global Warming (in Russian), Izvestia Akad. Nauk, Energetika, 2002, No. 2, P. 10–27.
- V. V. Klimenko, A. V. Klimenko, A. G. Tereshin, D. S. Beznosova. Energy Complex of Russia and Kyoto Protocol: Problems and Outlook (in Russian), Proc. of the Internat. Conf. «Theoretical and Practical Problems of Russia's Electrical Power Development» St. Petersburg, SPbGTU Publisher (St. Petersburg State Technical Univ.), 2002, P. 73–85.
- V. V. Klimenko, A. G. Tereshin, and O. V. Mikushina. Taking into Account Climatic Parameters Change with Long-Term Planning of Heat Supply Development (in Russian), Nov. Teplosnab. 2002, No. 2, P. 50–53.
- V. V. Klimenko. Climate and History in the Middle Ages (in Russian), Vostok (Orient), 2003, No. 1, P. 5–41.
- V. V. Klimenko, A. V. Klimenko, A. G. Tereshin, D. S. Beznosova. Greenhouse Gases Emission in the Energy Complex of Russia: History and Outlook (in Russian), Izvestia Akad. Nauk, Energetika, 2003, No. 1, P. 86–97.
- V. V. Klimenko, V. A. Klimanov. Cold Climate of the Early Subatlantic Age in the Northern Hemisphere (in Russian). Dokl. Earth Sciences, 2003, Vol. 391A, No. 6, P. 845–849.
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- V. V. Klimenko, A. G. Tereshin, D. S. Beznosova. Outlook Assessment of Climatic Parameters of Heat and Electricity Demand in Regional Energy Systems of Russia (in Russian), Vestnik MEI, 2003, No. 5, P.76–81.
- V. V. Klimenko, A. G. Tereshin, D. S. Beznosova, O. V. Mikushina, T. N. Andreychenko. Changes of the Heating Season Parameters in the Asian Russia as a Result of Global Warming (in Russian), Izvestia Akad. Nauk, Energetika, 2004, No. 4, P. 135–145.
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- V. V. Klimenko, O. V. Mikushina. History and Forecast of Climate Change of the Barents and Kara Seas Basin, Geoecology, 2004, No. 6.

Partners

- Department of Geology, Moscow State University, Moscow
- Department of Geography, Moscow State University, Moscow
- Department of History, Moscow State University, Moscow
- Institute of Geoecology, Russian Academy of Sciences, Moscow
- Institute of Energy Strategy, Moscow
- German Aerospace Center, Oberpfaffenhofen, Germany
- University of Westphalia, Mьnster, Germany
- Rhine University, Bonn, Germany
- Alexander von Humboldt Foundation, Bonn, Germany

SCIENTIFIC-RESEARCH DEPARTMENT «PROBLEMS OF CONTROL IN THE FIELD OF ENERGY AND RESOURCES SAVING»

The SRD EKOS staff Consists of 4 researchers and Leading Researcher, 2 engineers Cand..Scs. (Techn)

The head of the Department is Boris F. REUTOV,

Main directions of researches

Supervisors

- **Development of scientific-methodical fundamentals for energy and resources saving activities control including the principles for creation federal, regional and municipal energy saving programs and principals for creation and application of regulatory, financial and technological policy in the field of energy saving to be developed.**

  Leading researcher Boris F. Reutov
- **Scientific-methodical researches and development of informative-analytical system for the demonstration of achievements, technologies and materials in the field of energy saving control with the application of modern informative technologies.**

  Leading researcher Boris F. Reutov, Junior researcher Alexei P. Antropov
- **Scientific methodical fundamentals development for realizing the energy efficient projects with the application of the Kioto protocol provisions to palatalize the global climate changes consequences.**

  Leading researcher Igor N. Pyzhov
- **Researches of the principals for ecologically pure substances and materials application in up-to-date energy efficient facilities**

  Leading researcher Eugenie E. Ustyuzhanin

Agreements, contracts, Projects supported by the State Budget

- Scientific methodical researches and development of the programme complex structure to provide the informative-analytical system to be created and functioned for technical, technological and financial solutions being supported and adopted.
- Development of programme-analytical complex to investigate the thermodynamic efficiency of super critical cycles of heat pumps and thermo transformers using carbon dioxide. The methods development to compare and choice energy efficient cool agents both natural and synthetic origin. Analysis of energetic and ecological advantages and disadvantages of carbon dioxide as cool agent for direct and return thermodynamic cycles based both on experimental and designed investigations.

Key publications

- Reutov B.F., Puzhov I.N., Naumov A.L, Semenov V.? National Report «Heat Supply of the Russian Federation. Ways out of crisis» Book 1 «The Russian Federation heat supply and consumption system reform».Ed.Moscow Energetic Institute (MEI), 2002
- Reutov B.F, Pyzhov I.N., Antropov A.P, Naumov A.L, Semenov V.? National Report «Heat supply of the Russian Federation. Ways out of crisis» Book 2 «Recommendations on the regional and municipal programs being worked out to develop heat supply system» Fabrika offsetnoi pechati Publisher, 2003
- Reutov B.F, Pyzhov I.N, Antropov A.P, Naumov A.L, Abramchenko A.? National Report «Heat supply of the Russian Federation. Ways out of crisis» Book 3. «Methodical recommendations for autonomous boilers designing, built and put into operation» Fabrika offsetnoi pechati Publisher, 2003

- Pyzhov I.N., Nemkov Ju.A., Abramchenko A.?, Naumov A.L., Rybov A.? National Report «Heat supply of the Russian Federation. Ways out of crisis» Book 4. «Methodical recommendations for the basement autonomous gas boilers to be put into operation» Fabrika offsetnoi pechati Publisher, 2003

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- **Department of Electromechanics .....**
- **Department of Physics of Electrotechnical materials and Components and of Automation of Electrical-Technology Complexes .....**
- **Department of Electrotechnical Complexes of Self-Contained Objects .....**
- **Department of Electrical and Electronic Apparatuses .....**
- **Department of Ecology Engineering and Protection of Labor .....**
- **Department of Engineering Management .....**
- **Department of Automated Electric Drive .....**
- **Department of Electric Transport .....**
- **Department of Power Supply of Industrial Enterprises .....**

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Department's Staff:
27 professors;
7 researchers,
10 Ph.D.-students

Head of the Department
Ph.D., Assoc. Prof.,
Sergey V. SHIRINSKII

Basic research fields

project supervisor

- **Development of controlled electric machines and control systems for it**
  Prof. Kuznetsov V.A.
- **Research and development of theory and analysis methods of magnetic fields in electric machines**
  Prof. Ivanov-Smolenskii A.V.
- **Development of electric machines analysis and design methods for steady-state and transient operation conditions**
  Prof. Bespalov V.Ya.
- **Development of CAD-systems for small power electric machines**
  Assoc.Prof. Semenchukov G.A.
- **Development of high-speed solid-state voltage stabilizers**
  Sr. Researcher Sergeenkov B.N.
- **Improvement of calculations methods and design of synchronous micro-motors**
  Prof. Osin I.L.

Contracts, grants and state-owned projects

- Methods of AC machine design based on the magnetic field theory in electric machines
- CAD-systems for conventional and special-purpose electric machines
- Development of design documentation for power supply sources for 1-4 kW xenon lamps
- Research and design of switched-reluctance electric drive
- Development of energy and resources saving electromechanical converters
- Research of linear induction motors.

Key publications

- Kopylov I.P. Gelioelectromechanics (in Russian). MPEI Publisher, 2003
- Kuznetsov V.A., Kuzmichev V.A. Switched-reluctance motors (in Russian). MPEI Publisher, 2003
- Osin I.L., Yuferov F.M. Electric machines of automated devices (in Russian). MPEI Publisher, 2003. 424 p.
- Akimova N.A., Kotelenets N.F., Antonov M.V. Testing, Maintenance and Repair of electric machines (in Russian). Academia Publisher, 2003. 384 p.
- Akimova N.A., Kotelenets N.F. Senturihin N.I. Mounting, technical maintenance and repair of electrical equipment (in Russian). Academia Publisher, 2004. 296 p.

- Sokolova E.M. Electrical and electromechanical equipment: industrial and household devices (in Russian). Academia Publisher, 2003. 224 p.
- Sokolova E.M., Rozanov Yu.K. Electronic devices for electromechanical systems (in Russian). Academia Publisher, 2004. 270 p.
- Ivanov-Smolenskii A.V. Electric Machines (in Russian). Vol.1 and 2. MPEI Publisher, 2004. 448 p., 532 p.
- Shirinskii S.V. New Information Technologies (in Russian). MPEI Publisher, 2003.
- Fisenko V.G. Numerical analysis of electro-magnetic fields in electric machines based on FD method (in Russian). MPEI Publisher,2003
- Kopylov I.P. Electric Machines. Textbook (in Russian). Vyshaya Shkola Publisher, 2004. 607 p.
- Kuznetsov V.A., Shirinskii S.V. Synchronous generator with hybrid excitation (in Russian). Elektrichestvo, No10, 2003 pp. 2-4
- Kuznetsov V.A., Shirinskii S.V. Analysis of magnetic circuit of synchronous generator with variable pole number (in Russian). Elektrichestvo, No7, 2003 pp. 46-52
- Semenchukov G.A., Zaharenko A.B. Resistance of short-circuit ring of induction motor squirrel cage (in Russian). Elektrichestvo, No.12, 2003 pp. 35-39.
- Moschinskii Yu.A., Petrov A.P. Mathematical model of induction motor based on equivalent circuit for transient conditions (in Russian). Elektrotechnika, No.2, 2003 pp. 24-30.
- Bespalov V.Ya., Moschinskii Yu.A., Tsukanov V.I. Simplified mathematical model of transient heating and cooling of induction motor stator winding (in Russian). Elektrichestvo, No.4, 2003 pp. 20-27
- Moschinskii Yu.A., Petrov A.P. Mathematical model for analysis of induction motor stopway (in Russian). Elektrotechnika, No.1, 2004 pp. 19-22
- Lopukhina E.M., Semenchukov G.A., Zaharenko A.B. Novel electronically commutated starter-generator for electric vehicle (in Russian). Elektrichestvo, No.4, 2003. Pp. 31-36.
- Research of the additional asynchronous and synchronous torques supression in induction capacitor motors of increased rated power and its automated design (in Russian). Lopukhina E.M., Semenchukov G.A., Mashkin V.G. et al. Elektrichestvo, No.5, 2003, pp. 43-50.
- Kuznetsov V.A., Kuzmichev V.A., Matveev A.V. Switched Reluctance Motor for Blow Fan of Electrical Power Plant. -Proceedings of Summer Seminar on Nordic Network for Multi Disciplinary Electric Drives, June 21- 23 2003, Zegrze, Poland, pp 55-59. (in English)
- Matveev A., Kuzmichev V., Nilssen R., Undeland T. Two Approaches to Modelling of Switched Reluctance Drives. – Proc. of the Tenth European Conf. on Power Electronics and Applications, September 2 – 4, 2003. Toulouse, France, 10p. (in English)
- V. Bespalov, M. Panihin., Y. Moschinskii., V. Chukanov. Multilevel model of ac commutator for motors. – Proc. of the 6th Intern. conf. on Unconventional Electromechanical and Electrical Systems, vol.3, Alushta, Ukraine, September 25-29, 2004, p. 811-813. (in English)
- V. Bespalov, B. Sidelnikov. Perspective is frequent regulation electrical drives. Ibid, p.39-47. (in English)
- V. Bespalov, I. Aliev. Characteristics of asynchronous energy motor. Ibid, p. 241-245.(in English)
- Bespalov V.Ya., Izotov A.I., Shestakov A.V. Features of power gauges calculation of induction motors under non-sinusoidal power supply (in Russian). Proc. of the All-Russian conf. «Science-Industry-Technologies-Ecology», Vol.4, Kirov,2004 pp. 134-135

- Bespalov V.Ya., Izotov A.I., Shestakov A.V., Timina N.V. Calculation of transient processes of PWM-inverter fed induction motor while taking into account saturation and iron losses (in Russian). Ibid, pp. 135-136.
- Kuznetsov V.A., Shirinskii S.V. Automobile generator with permanent magnets and field winding (in Russian). Proc. of ICEEM-2003, Crimea, pp. 403-406.
- Fisenko V.G., Popov A.N. Analysis of calculation methods of iron losses in switched-reluctance motors (in Russian). Ibid, pp 428 -432.
- Kuznetsov V.A., Shirinskii S.V. Synchronous generator with variable pole number (in Russian). Proc. of the Intern. .conf. "Electromechanical and electromagnetic converters and controlled electromechanical systems – EECCES", 2003, Ekaterinburg, pp. 8-11.

Partners

- «All-Russian Research Institute of Electromechanics» (VNIIEM), Moscow, 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
- Ford Motor Company, Dearborn, Michigan, USA
- Norwegian University of Science and Technology – NTNU, Trondheim, Norway
- Sophia Technical University, Sophia, Bulgaria
- University of Calgary, Calgary, Canada
- Wisconsin-Madison University, Madison, Wisconsin, USA
- Colorado University at Denver, Colorado, USA
- University De Valle, Cali, Columbia
- University of Punta Arenas, Chili
- San Sebastian University, Arequipa, Peru
- Tsinghua University, Beijing, China
- Dong Fong Works, China

DEPARTMENT OF PHYSICS OF ELECTROTECHNICAL MATERIALS AND COMPONENTS AND OF AUTOMATION OF ELECTRICAL TECHNOLOGY SYSTEMS

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26 lecturers,
10 research workers,
and 18 Ph.D. students

Head of Department:
Sergei V. SEREBRIANNIKOV
Doctor. Sci. (Tech.), Prof.,
Member of the Russian Academy of Electrical Engineering

Main Lines of Research

Research supervisors:

- **Development of radar absorbing materials and coatings**
  Prof. S.V. Serebryannikov, Assoc. Prof. V.P. Cheparin
- **Development and investigation of heterogeneous composite electrotechnical materials**
  Prof. V.A. Filikov
- **Development of biocompatible materials for application in surgery**
  Prof. P.A. Arsen'ev
- **Development of equipment and technologies for the synthesis of high-temperature oxide materials**
  Prof. A.M. Balbashov
- **Development of equipment for low-temperature induction heating**
  Prof. A.B. Kuvaldin
- **Development of computer and microprocessor control systems for electrical technology facilities**
  Prof. V.P. Rubtsov
- **Development of fundamentally new electrical technology processes for preparing pure and composite materials, deposition of coatings, solution of environmental problems**
  Prof. V.P. Rubtsov
- **Research and development of equipment for ion-plasma material treatment**
  Assoc. Prof. E.V. Dolbilin
- **Development and improvement of controlled power supply for electrical technology facilities**
  Assoc. Prof. V.I. Peshekhonov
- **Optimization of structures and technologies for the production of communication cables**
  Assoc. Prof. I.B. Ryazanov
- **Development of web-applications for education**
  Assoc. Prof. A.I. Tikhonov

Agreements, Contracts, Projects Supported by State Budget:

- Development of radio-wave absorbing coatings
- Development of process equipment for crusibleless zone melting with radiation heating

- Development of high-quality electric ceramics
- Web-applications in Electrical materials Science
- Investigation and optimization of controlled power supply for plasmatron
- Investigation of the electrotechnology processes effect on the environment and reduction of their negative impact
- Investigation of the operation modes of induction technological facilities
- Technologies investigation for conducting coatings vacuum deposition

Key Publications

- Kuvaldin A. B. Lepioshkin A.R. Rolling section and slab driven cooling with induction heating at restricted thermotension (in Russian). Electrical Metallurgy, 2003, #1, p. 13-20.
- Tikhonov A.I. Efficient Textbook Web-publishing (in Russian). Proc. of the Conf. «Educational Resources and Publications» Mainstream Publisher», 2002, p. 73-82.
- Anatoli M. Krouchinin, Antoni Sawicki. A theory of electrical arc heating. Czenstochowa. 2003. –180 p.
- Anatoli M. Kruczinin, Antoni Sawicki. Podstawy proektowania ukladow dynamicznych z lukiem elektrycznym (In Polish). – Czenstochowa, 2004. 167 p.
- Kuvaldin A. B. Lepioshkin A.R. Urgent regimes for unductional surface hardening with the account of thermal and residual strains (in Russian). Electricity, #5, 2004, p. 29-33.
- Kuvaldin A.B., Lepioshkin A. The rate of induction superficial hardening in view of thermal and residual stresses. Proc. of the Intern. Conf. «Heating by electromagnetic Sources – HES-04». Padua, 22-25.08.04. 2004. P.661-666.
- Kuvaldin A.B., Boiko F.K., Ptitsyna E.V. Zum Betrieb kleiner Stahlschmelz-Licht-bogenцfen mit nichtsinus-fцrmigem Strom – Einfluss auf die Lichtbogenstabilitдt Workshop Elektroprozesstechnik – Erwдrmen und Schmelzen mit elektrothermischen und alternativen Verfahren. Tagungsband. Technische Universitдt Ilmenau. 21.-24. Sept. 2004.
- Rubtsov V.P., Emelianov A.L., Kirichenko V.V. Structural Modelling method application for power sources investigation for electric discharge in vacuum. Electricity (in Russian), #5, 2004, p. 22-28.
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- Maslov S.I., Arbuzov Yu.V. Ochkov V.F. Open Power Engineering University Electronic Educational Resources (in Russian). Proc. of the Conf. «Educational Environment Today and Tomorrow», Moscow, 29.09—2.10.04, p. 231-232.
- Doped Hexagonal M- and W-type Ferrites (in Russian). / Eremtsova L.L, Cheparin V.P. Serebriannikov S.P. et al.. Proc. of the XII Intern. Conf. «Spin Electronic and Gyrovector Electrodynamics», Moscow, Firsanovka, 2003, p. 115-117.
- Vorobiev A.S., Duhovskoi V.P., Serebriannikov S.P., Cheparin V.P. Foamed Polyurethane Ferrite Filled Thermodestruction (in Russian). Proc. of the 5th Intern. Conf. «Electromechanics, Electrotechnology and Electromaterial Science», Crimea, Alushta, 2003, p. 21-24.
- Gyromagnetic filter for Rectangular Waveguide (in Russian). Karpov V.N. Kitaitsev A. A., Konkin V.A. et al.Ibid, p. 199-203.
- Cheparin V.P., Eremtsova L.L., Abramov A.V. Phisical and Chemical Properties of the High Temperature Sulution-melt for Monocrystalline Hexagonal Ferrites (in Russian). Ibid, p. 169-172.

Dissertations

- Savalyk N.A. Increasing uniformity of electron-beam film coating to film materials in electronic beam equipment. Cand. Sci. (Tech.) Dissertation, 2003
- Boev A.M. Development and evaluation of reliability of self-bearing isolated wires. Cand. Sci. (Tech.) Dissertation, 2004
- Serebriannikov S.V. Electric field and polymer modification influence on and electrotechnic materials properties and performance, Dr. Sci. (Tech.) Dissertation, 2004.
- Patents
- Kuvaldin, A.B., Abdarashidov V.M., Travnikov E.P. Inductional fluid heater AKBA-ET (variants). Useful model patent № 31087 RF, registration 12.05.2003. Byull. №9, 10.07.2003.
- Device for dielectric or semiconductor materials heating (in Russian). Kuvaldin, A.B., Lepioshkin A.R., Bychkov N.G. et al. Useful patent RF Patent №37900, registration 24.11.2003, Byull. № 13, 10.05.2004.
- Kuvaldin, A.B., Abdarashidov V.M., Travnikov E.P. Transformer type inductional fluid heater. RF Patent № 2233561, registration 20.03.2003, Byull. Izobret., 2004, no. 21

Partners

- Institute of Electronics, Bulgarian Academy of Sciences, Sofia, Bulgaria
- Czenstochowa Polytechnic University, Czenstochowa, Poland
- Technical University of Ilmenau, Germany
- Tuyang University of Technology, People's Republic of China
- Research Center for Problems of Intellectual Property (NITs PRIS), Moscow
- Army Medical Academy, Ministry of Defense of the Russian Federation, St. Petersburg
- All-Russia Research Institute of Electrothermal Equipment (VNIIETO), Moscow

Unique Equipment

- Equipment for the synthesis of high-temperature oxide compounds by optical zone melting
- Equipment for thermographic and calorimetric analysis
- Induction heating facility with cryogenic cooling of the inductor
- Electron-beam facility for heating refractory materials
- Vacuum high-temperature resistance furnace
- Distance learning complex on Electromaterial Science

DEPARTMENT OF ELECTROTECHNICAL COMPLEXES OF SELF-CONTAINED OBJECTS

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The department has on its staff
15 lecturers,
11 research workers,
and 9 Ph.D. students

Head of Department:
Sergei I. MASLOV
Dr. Sci. (Tech.), Prof.

Main Lines of Research

Research supervisors

- **Power supply systems for self-contained objects and sources of secondary supply**
  Prof. V.G. Eremenko, Sr. Researcher A.B.Aparov
- **Automation of research and development of electromechanical and electrotechnical systems**
  Prof. S.I. Maslov, Chief Researcher Yu.V. Arbuzov
- **General-purpose electric drives on the basis of synchronous motors with controlled magnetic excitation**
  Prof. V.N. Tarasov
- **Generator units of self-contained systems of power supply**
  Prof. P.A. Tyrichev
- **Electronic inverters and inverter-based electronic systems**
  Chief Researcher G.S. Mytsyk
- **Electromechanical systems on the basis of inductor machines and synchronous machines with permanent magnet excitation**
  Chief Researcher A.M. Rusakov
- **Thyratron electric drives highly adaptable to manufacture for use with industrial and household mechanisms**
  Assoc. Prof. V.I. Nagaitsev

Agreements, Contracts, Projects Supported by State Budget

- Complex of data-processing and measuring instruments and signal sources for the automation of educational experiments with a possibility of remote access
- Development of methods and means for research and design of ac electronic electromechanical systems on the basis of inductor electromechanical converters and synchronous machines with permanent magnet excitation
- Development of the concept and scientific and technical support of educational complexes for general professional training in the system of public technical education
- Development of electric drives for oil production equipment, micro-cryogenic systems, compressors of refrigeration units, urban transport, and excavating machines
- Development of generators for self-contained power plants, such as wind-driven generators, hydroelectric generators, and supply line-feeding generators
- Development of devices for self-contained power supply of spacecraft
- Development of electronic devices and systems, including military applications
- Light engineering pulse current sources and low voltage high-current sources
- Non-contact systems for compact accumulators charging
- Development of electromechanical systems on the basis of synchronous motors with controlled magnetic excitation

Key Publications

- Education informatization: trends, means, technologies (in Russian). Textbook for professional development courses. Edited by S. Maslov, MPEI Publisher, 2004. 1000 pages
- V.N. Tarasov, S.Y. Ostanin, A.P.Seleznev, M.N. Anisimov. Prospects of electrical power complexes of flying objects development (In Russian). Proc. of the seminar of Electrical equipment department of Zhukovsky Air force engineering academy: VVIA Press, 2003, p. 88-98.
- V.N. Tarasov. Design, adaptation and application of electric drives on the base of synchronous motors with adjustable magnetic excitation (in Russian). Proc. of the VIII Symposium «Electrical engineering 2010» «Prospective types of electrotechnical equipment for electrical energy transmission and distribution». 2003. p. 62-68.
- G.S. Mytsyk, V.V. Mikheev. Quality improvement of power consumption by forked consumers (in Russian). Electrika. № 8, 2003. p. 24-28.
- G.S. Mytsyk, V.V. Mikheev. State-of-the-art trends and ways for power electronics devices perfection. «Power supply» Association. 2003.
- Power installations for guaranteed low capacity power supply based on one-bladed «WINDEK» series wind turbines (in Russian). A.M. Rusakov, I.A. Zherdev, S.V. Gribkov et al. Proc. of the Intern. conf. «Renewable power engineering: 2003. Condition, problems, prospects». SPbGTU Publisher. 2003. p. 369-375.
- S.Y. Ostanin, S.Y. Akin'shin. Calculations for hysteresis-reluctance motors with massive rotor in the visual programming environment. Vestnik MEI, 2003, № 4. p. 24-32.
- Simulation of the secondary power supply pulse source (in Russian). V.G. Eremenko, N.B. Zhirnova, G.L Lipkin et al. Elektricheskoe pitanie. Special edition. «Secondary power supply systems and sources and their element base». M., 2004, p. 12-23

Dissertations

- A.B. Aparov. Independent power supply installations with low voltage primary sources: continuous work time and reliability increase. Dr. Sci. (Techn) Dissertation, 2004.
- A.M. Formakidov. Design and research of electromagnetic tools for metallic melts parameters measurement for automatic process control systems in metallurgy. Cand. Sci. (Techn) Dissertation, 2004.

Partners

- State Research Institute of Systems Integration, Moscow
- Moscow State Aviation Institute (MAI), Moscow
- Moscow Bauman State Technical University (MGTU), Moscow
- Aeroelektromash Company, Moscow
- Ural Electrochemical Works, Novoural'sk, Russia
- RITEK Company, Moscow
- Research Institute of Computer Complexes, Moscow
- Aviation Electronics and Communication Systems, Moscow
- TSENTROTEKH-EKhZ Scientific-and-Technical Center, St. Petersburg
- Federal State Unitary Enterprise «Prozhektor Leading Experimental Design Bureau», Moscow
- Yakor' Experimental Design Bureau, Moscow
- The research-and-production association «Mechanical engineering», Moscow

Unique Equipment

- Automatic laboratory complex for the investigation of electromechanical and electrotechnical systems with remote access via computer networks

DEPARTMENT OF ELECTRICAL AND ELECTRONIC APPARATUSES

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The department has on its staff
20 lecturers,
24 researchers,
and 12 Ph.D. students

Head of Department:
Maxim V. Riabchitskiy
Cand. Of Sci. (Techn), Assoc. Prof.
Member of the Power Electronics Engineers Association, Institute of Electrical and Electronics Engineers (IEEE)

Main Lines of Research

Research supervisors

- **Research and development of multifunctional contact-semiconductor equipment for switching, protection, and control**
  Prof. Yu.K. Rozanov
- **Research and development of power controllers of the energy quality for power supply systems**
  Prof. Yu.K. Rozanov, Assoc. Prof. M.V. Ryabchitskiy
- **Research and development of systems with electromechanical and power electronic control on the basis of microprocessors and microelectronics**
  Assos. Prof. A.A. Kvasnyuk
- **Development of methods for analysis of electromagnetic systems**
  Prof. V.N. Shoffa, Prof. P.A. Kurbatov
- **Research and development of dc and ac electromagnetic systems for enhancement of oil and gas-condensate recovery**
  Prof. A.P. Kurbatov
- **Basic research of physical phenomena and development of systems with liquid-metal composite materials in a vacuum chamber**
  Prof. V.G. Degtyar'
- **Investigation of artificial intelligence systems for the choice of electrical apparatuses and evaluation of their reliability**
  Prof. A.G. Godzhello, Sr. Lecturer A.V. Kalashnikova
- **Research and development of secondary supply sources involving the use of high-speed magnetic switches**
  Assoc. Prof. L.L. Khruslov

Agreements, Contracts, Projects Supported by State Budget

- Development of the principles and fundamentals of the control and commutation theory for electrical power flows by means of modern power electronics
- Research and development of the principles of modular systems of independent power supply for special complexes
- Certification testing of electromechanical apparatuses, semiconductor converters, and continuous supply units
- System of quality control of the magnetic parameters and permanent magnets manufactured using the equipment previously employed for the production of nuclear weapons

- Artificial intelligence system which is object-oriented to the choice of electrical apparatuses and interacts with a relational data base
- Development of the theory and manufacture technology of liquid-metal contact units, which offer a higher reliability and lower materials and power consumption
- Elaboration of the control theory fundamentals for the quality of electrical power and development of models and mock-ups of active power stabilizer filters using the element base of power electronics
- Development of submersible downhole electromagnetic devices for integrated acoustic and magnetic stimulation of the bottom-hole zone of oil formations
- Development of analysis methods and design of electromagnetic vibration units for enhancement of oil and gas-condensate recovery

Key publications

- Belkin G.S. Commutation processes in electric apparatuses (in Russian). Znak Publisher, 2003.
- Degtyar' V.G. Development of liquid-metalic contacts and contact devices (in Russian). Vestnik MEI. No 2, pp. 51-54.
- Rainin V.E., Enns V.I. Technical features for electric energy registration in private life (in Russian). Energosberezhenie, 2003. No. 2, pp. 19-20.
- Baranov N.N. On a possibility of fluactuation diagnostic methods for the analysis of a state and an efficiency of systems and objects of a different physical nature (in Russian). Izvestia RAN. Energetika. 2004. No 6, pp. 66-78.
- Belkin G.S., Pertsev A.A., Rylskaya ДюФю Parallel connection of several vacuum interrupters in a circuit-breaker pole. Proc. of the Intern. Symp. on Discharges and El. Ins. In Vacuum, 2004, vol.2. pp. 333-336.
- Kuznetsova E.A., Kurbatov P.A., Tyrichev P.A. Incoming inspection of the constant magnets' magnetic parameters with the aid of Helmholtz coil (in Russian). Proc. of the V-th Intern/ Conf. «Electrical materials and components». 20-25 of Sept. Crimea, Alushta. 2004. P. 98-99.
- Baranov N.N., Rozanov Yu.K., Solomatin A.V. Application area widening for non-traditional energy sources (in Russian). Ibid, p. 210-211.
- Rainin V.E., Popova E.P. Power current converter on the base of MOS transistor (in Russian). Ibid, p. 212-213.
- Rozanov Yu.K., Popova E.P., Yurov K.M. Energy flows control in an energy saving installation for inspection of electrical energy sources and commutation apparatuses (in Russian). Ibid, p. 217-218.
- Korobkov Yu.S. The usage of the relative magnetic conductivity form for an analysis and a calculation of systems with constant magnets (in Russian). Ibid, p. 336-338.
- Rainin V.E. New developments in the field of current sensors for static electric energy counters. Comments of the specialist (in Russian). Energosluzhba predpriyatii. 2004. No. 3, p. 44-46.
- Rozanov Yu.K., Riabchitsrii M.V., Kvasniuk A.A. Secondary supply sources: from a network transformer to a power factor corrector (in Russian). CHIP news. 2004. No. 2 (85), p. 4-8.
- Rozanov Yu.K., Bespalov V.Ya., Smirnov M.I. The motor start-up device which is compensating the reactive power necessary for the motor (in Russian). Proc. of the Ural Technial University conf. «Energy saving in enterprise economy». Ulianovsk. 28-31 of May. 2004, p. 26-30.

- Rozanov Yu.K., Riabchitskii M.V., Kvasniuk A.A., Smirnov M.I. Physical modeling of a static reactive power compensator (in Russian). Proc. of the conf. «OICE Power electronics». Electrovypriamital plant. Saransk, 10-11 of Nov., 2004, p. 43-45.
- Riabchitskii A.A., Serebriakov D.S. Combined inspections of low-volt apparatuses for maximum commutation ability (in Russian). Elektrotekhnika i electromekhanica. 2004. P. 25-27.
- Shoffa V.N., Chicheriukin V.N., Ivakin B.F. A calculation method of complex magnetic systems for the polarized relay with the account of a leakage flux and a magnetic core resistance (in Russian). Elektrichestvo. 2004. No 2. P. 44-48.
- Shoffa V.N., Melzin'skii B. Germetically sealed contacts inspection in standard winding which is equivalent their operation in electric units (in Russian). Elektricheskie kontakty i electrody. Inst. of material sciences problems named after I.N. Frantsevitch Publisher. Ukraine Academy of Sciences. Kiev, 2004. P. 47-49.
- Shoffa V.N., Chicheryukin V.N., Ibakin B.F. The design of the complex magnetic systems of polarized relays taking inti account the leakage fluxes and reluctance of the magnetic circuit. Electrical Technology Russia. 2004. No. 1. ZNACK Publisher, P. 31-32.
- Shoffa V.N., Chicheryikin V.N., Ivakin B.F. A mathematical model and a procedure for dtsigning the complex system of polarized relays. Ibid, P. 20-22.

Partners

- Pskovelektromash Company, Pskov, Russia
- Scientific-and Production Enterprise «All-Russia Research Institute of Electromechanics» (NPP VNIIEM), Moscow
- State Center «Andreev Acoustic Research Institute», Moscow
- State Unitary Enterprise «Lenin All-Russia Institute of Electrical Engineering» (GUP VEI), Moscow
- INELS Scientific-and-Production Enterprise (NPP INELS), Moscow
- Engineering-and-Production Consortium «Intellectual Power Electronics», Moscow
- ELOKR Small State Scientific-and-Production Enterprise (MGNP ELOKR), Moscow
- Scientific-and-Technical Committee of Strategic Rocket Forces of the Ministry of Defense (NTK RVSN MO), Moscow
- Peter the Great Military Engineering Academy of Strategic Rocket Forces, Moscow
- Prozhektor Leading Experimental Design Bureau (GOKB Prozhektor), Moscow
- ABB Semiconductor, Moscow
- Siemens, T.O. Intex, Moscow
- Sapfir Scientific-and-Production Association (NPO Sapfir), Moscow
- Energoservis Company, Moscow
- Elektroprivod Scientific-and-Production Association (NPO Elektroprivod), Moscow
- Tavrida-Elektrik Company, Moscow
- All-Russia Research Institute of Relay Making (VNIIR), Cheboksary, Republic of
- Chuvashia, Russian Federation
- IVTAN (Institute of High Temperatures) Scientific Association, Russian Academy of Sciences, Moscow

Unique Equipment

- Downhole acoustic facilities for enhancement of oil and gas-condensate recovery
- Vacuum test bed for electrical apparatuses of up to 5 kA

- Set of equipment for testing electrical apparatuses under high-pressure conditions
- Set of equipment for testing low-voltage apparatuses and continuous power supply units
- Unique equipment
- Downhole acoustic facilities for enhancement of oil and gas-condensate recovery
- Vacuum test bed for electrical apparatuses of up to 5 kA
- Set of equipment for testing electrical apparatuses under high-pressure conditions
- Set of equipment for testing low-voltage apparatuses and continuous power supply units

DEPARTMENT OF ECOLOGY ENGINEERING AND PROTECTION OF LABOR

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The department has on its staff
25 lecturers,
6 research workers,
and 8 Ph.D. students

Head of Department:
Viktor T. MEDVEDEV
Honored Scientist of the Russian Federation
Dr. Sci. (Tech.), Prof.,
Member of the International Academy of Sciences in Ecology and Safety of Vital Activities,
Corresponding Member of the Russian Academy of Electrical Engineering

Main Lines of Research

Research supervisors

- **Development of a unified system of environmental monitoring**
  Prof. V.T. Medvedev, Assoc. Prof. V.V. Skibenko, Prof. .L. Suzdaleva
- **Geoinformational technologies in environmental monitoring**
  Assoc. Prof. T.N. Maslova
- **Electrical safety**
  Prof. V.T. Medvedev, Assoc. Prof. A.V. Karalyunets
- **Electromagnetic compatibility**
  Prof. E.S. Kolechitskii
- **Research and development of diagnostic systems of bronchial-andpulmonary diseases**
  Prof. V.T. Medvedev, Prof. V.S. Malyshev, Assoc. Prof. A.V. Karalyunets
- **Scientific methods for support of certification tests and systems of labor protection certification of enterprises and organizations**
  Prof. V.T. Medvedev, Assoc. Prof. A.V. Karalyunets
- **Research and development of automated systems of monitoring and control by environmentally oriented technological processes**
  Assoc. Prof. A.K. Makarov, Sr. Researcher D.G. Bukharov, Assoc. Prof. A.V. Karalyunets
- **Development of new-generation semiconductor-based sensors of harmful substances**
  Assoc. Prof. A.F. Monakhov

Agreements, Contracts, Projects Supported by State Budget

- Investigation of the electrical technology processes effect on the environment and the principles development for their negative effect decreasing
- Development of procedures for energy-oriented monitoring of power supply systems of educational institutions
- Preparation of the section «Electrical Safety» of the educational training methods set on the subject «Safety of Vital Activities» for regional centers of the public education system
- Scientific-and-technical examination and investigation of the operating characteristics of computerized engineering complexes
- Author and designer supervision of commercial production of control units for infrared radiators

- Basic research and development of methods for reducing the vibroacoustic parameters of electrical machines for high-voltage objects
- Investigation of development and implenentation problems for advanced systems of environmental monitoring of military and civil objects
- Development of a computerized diagnostic system for monitoring the state of the bronchial-and-pulmonary system in pediatrics
- Investigation of dangerous and harmful production factors characteristics levels on workplaces for their certification, and development of recommendations for reducing these levels

Key Publications

- T.N. Maslova, L.N. Kopylova, S.G. Novikov. Safety of life activity: electronic textbook (in Russian). MPEI Publisher, 2004.
- Fedorova E.V. Fundamentals of toxicology (in Russian). MPEI Publisher, 2004.

Dissertations

- Polianskiy D.A. Scientific bases development of safety labor improvement in electrical power ebgineering in the conditions of energy saving technologies and engineering implementation (in Russian). Cand. Sci. (Techn) Dissertation, 2004.

Partners

- Scientific-and-Production Association of Instrument Making for Space Applications, Moscow
- Research Institute of Pediatrics and Infant Surgery of the Russian Ministry of Health, Moscow
- Federal State Unitary Enterprise Armatura Design Bureau, Kovrov, Russia Unique Equipment
- Russia's Joint-Stock Venture «UES of Russia»

Unique equipment

- PATTERN computerized diagnostic complex
- Automated system of environmental monitoring and meteorological parameters
- Complex for certification tests of equipment associated with information technologies
- Automated system of quality control for water
- Complex for automated monitoring of the vibroacoustic characteristics of electrical machines and mechanisms
- Anechoic chamber with a set of equipment for the investigation of vibration and noise
- Multimedia complex with receiving antennas of NTV and Hot Bird systems of television broadcasting
- Set of laboratory equipment for electrical safety research
- Set of equipment for quality control of industrial and drinking water supply
- Set of educational training methods on the subject of Safety of Vital Activities for the
- public education system
- Test laboratory for researching of dangerous and harmful industrial factors

DEPARTMENT OF ENGINEERING MANAGEMENT

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The department has on its staff
24 lecturers and
33 Ph.D. students

Head of Department:
Valerii K. LOZENKO
Dr. Sci. (Tech.), Prof.,
Member of the International Academy of Informatization

Main Lines of Research

Research supervisors

- **Management of quality control systems**
  Prof. V.K. Lozenko
- **Management of State and municipal purchases — organization and procedure of competitive bidding (tenders)**
  Prof. G.M. Vedeneev
- **Decision-making procedures and management of financial risks**
  Assoc. Prof. L.M. Ametistova

Agreements, Contracts, Projects Supported by State Budget

- Development of the procedure and regulations for no-competition purchases of R&D results for needs of the city of Moscow in accordance with standard legal provisions

Key Publications

- Bratolyubov, V.B. and Lozenko, V.K., A System for Quality Assurance and Control — Present-Day Organization of Industrial Business. Part 1: The Concept of the System, Its Evolution, and Tendency for Development. Basic Mechanisms (in Russian), Moscow, MPEI Publishers, 2001.
- Bratolyubov, V.B. and Lozenko, V.K., Assessment and Analysis of the Consumer Quality of Products: A Procedure Handbook (in Russian), Moscow, MPEI Publishers, 2001.
- Bratolyubov, V.B. and Lozenko, V.K., Assessment and Analysis of the Consumer Competitiveness of Products (in Russian), Moscow, MPEI Publishers, 2001.
- Kobzev, G.N., Vedeneev, G.M., and Efimov, A.P., Forms of Documents for Conducting Open Bidding for Purchases of Goods (in Russian), Moscow, MPEI Publishers, 2001.

Dissertations

- Tyurin, D.V., Taking Managerial Decisions for Investing into the Development of a Network of Large Commercial Organizations Based on the Ratings of Their Activities, Cand. Sci. (Econ.) Dissertation, 2002.

Patents

- Lozenko, V.K., Ishkov, A.V., and Volostnykh, V.V., A Device for Training the Wrist of a Sportsman, Application no. 2 001 134 399/20, decision of grant of RF utility model certificate of March 26, 2002 SPM no. 23 652.
- Lozenko, V.K., Ishkov, A.V., and Volostnykh, V.V., A Device for Training the Wrist of a Sportsman, Application no. 2 001 131 831/20, decision of grant of RF utility model certificate of February 12, 2002 SPM no. 23 137.

- Lozenko, V.K., Ishkov, A.V., and Volostnykh, V.V., A Device for Training to Improve Attack Actions in Single Combat, Application no. 2 001 130 019/20, decision of grant of RF utility model certificate of February 8, 2002 SPM no. 23 467.
- Lozenko, V.K., Ishkov, A.V., and Volostnykh, V.V., A Device for Training the Wrist of a Sportsman, Utility Model Application no. 2 001 131 831 of November 30, 2001.
- Lozenko, V.K., Ishkov, A.V., and Volostnykh, V.V., A Device for Training the Wrist of a Sportsman, Utility Model Application no. 2 001 133 921/20 of December 20, 2001.

Partners

- Electrical Equipment Plant for Automobiles and Tractors (ATE-1), Moscow
- Avtoelektronika Scientific-and-Production Association, Moscow
- Crosna-Motor Company, Moscow
- Agregat-Privod Company, Moscow
- Safonofskii Electromechanical Works Company (AO SEZ), Smolensk, Russia
- Energiya Rocket-and-Space Complex (RKK Energiya), Korolev, Moscow Region
- Lavochkin Scientific-and-Production Association, Moscow
- Lepse Scientific-and-Production Association, Kirov, Russia
- National Foundation for Training of Specialists, Moscow
- Moscow Foundation for Training of Specialists, Moscow
- Association of Financial-and-Industrial Groups, Moscow
- Elektromasheksport Trading Company, Moscow
- Pro-Invest Consulting, Moscow
- Institute of Industrial Development (Informelektro), Moscow
- Aktseptnyi Dom Company, Moscow
- Academy of National Economy under the Government of the Russian Federation, Moscow
- State Service Academy, Moscow
- State University of Management (GUU), Moscow
- Novosibirsk Institute of Electrical Engineering (NETI), Novosibirsk, Russia
- International Independent University of Ecology and Politology (MNEPU), Moscow
- Kirov Polytechnic Institute (KPI), Kirov, Russia
- East-Siberian University of Technology, Ulan-Ude, Republic of Buryatia, Russian Federation
- Russian Association of Business Education (RABO), Moscow
- Higher School of Economics — Institute of State Purchasing, Moscow
- Technical University, Hangzhow, People's Republic of China
- Nilsbrok College, Copenhagen, Denmark
- Gabrovo Technical University, Bulgaria

DEPARTMENT OF AUTOMATED ELECTRIC DRIVE

Head of the Department
Ph.D., professor
Yuri N. SERGIEVSKIY

Department has on its staff:
25 lectures
30 researchers
30 Ph.D. students

Main Research Directions

- **Control Systems Development with Regulation of Technological Parameters by Means of Electric Drive**

  Prof. Kozyrev S.K., Prof. Osipov O.I.
- **Methods and Technical Facilities Development Providing Energy and Resources Saving by Means of Electric Drive.**

  Prof. Il'inskiy N.F., Assoc. Prof. Ladygin A.N.
- **Control Methods and Technical Facilities for Switched Reluctance Electric Drives.**

  Prof. Il'inski N.F., Prof. Bychkov M.G., Assoc. Prof. Kozachenko V.F.
- **Theory and Control System Development for High-precision Servo Electric Drives.**

  Prof. Terekhov V.M.
- **Development of Two–Channel Precision Electric Drives with Piezo and Magnetostrictive Motors.**

  Leading Researcher Nikolski A.A.
- **Effective AC Drive Systems Development based on Thyristor Voltage Regulators.**

  Prof. Masandilov L.B.
- **Development of Precise Motion Reproducing Systems Based on Multicoordinate Stepping Motor Drives.**

  Senior Researcher Balkovoy A.P.
- **Universal Microprocessor Controllers for Electric Drives based on Advanced Electronic Components.**

  Assistant Prof. Kozachenko V.F.
- **Methodical and Technical Support of Electric Drives Testing.**

  Prof. Sergievskiy Y.N.
- **Development of Frequency Controlled Electric Drives Based on Modern Electronic Components.**

  Leading Researcher Koudryavtsev A.V., Assoc. Prof. Ostrirov V.N.

Contracts & Agreements in 2003-2004

- Comparative analysis and definition of researches perspectives in the field of electric drive and its components.
- Design methods and technical facilities development for electric drives focused to energy and resources saving technologies.
- Mechatronic motion modules with artificial intellect elements.
- Development of perspective technical solutions of the mass regulated switched reluctance electric drive.
- Modernization of pump station electric drive on the base of energy and resources saving unit with frequency converter.
- Calculation methods for object-oriented switched reluctance electric drives.
- Development of the controller for switched reluctance electric drive.

- Testing and certification of low–voltage devices, electronic converters and electric motors.
- Development and implementation of lathes magnetostrictive electric drives for precise turning of automotive plungers.
- Hybrid devices development based on thyristor voltage regulator for AC electric drive soft starting.
- Construction of linear stepping electric drive.
- Frequency regulated AC electric drive with vector control.
- Investigation of electromagnetic brake.

Main Publications

- «Electric drive and control systems» (in Russian). *MPEI Trans.*, Issue 679, Moscow, MPEI Publisher. 2003.
- «Electric drive and net technologies» (in Russian). *Proc. of the seminar of the Department of Automated Electric Drive*. MPEI Publisher, 2003.
- «Electric drive of excavators». *Proc. of the seminar of the Department of Automated Electric Drive*. MPEI Publisher, 2004.
- Kozachenko V.F., Chuev P.V. «Distortion reduction of inverter output voltage with vector PWM». *MPEI Bulletin,* No.4, 2002, pp. 43–48.
- Kozachenko V.F., Oboukhov N.A. and others. «Texas instruments DSP-microcontrollers in «UNIVERSAL» frequency converters with vector Control System». *Electronic Components* No.4, 2002, pp.61–64.
- Bogachenko D.D., Koudryavtsev A.V., Ladygin A.N. and others. «Control systems for energy saving electric drives for general application». *Electrotechnica*, No. 5, 2002, pp. 2-7.
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- Ostrirov V.N., Repetskiy D.V., Korpusov D.E. Effective application of frequency controlled electric drive in water supply systems of old buildings (in Russian). *Vestnik MEI,* No.1, 2003, pp. 55–60.
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Dissertations

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- Zubkov A.A. Research and development of thyristor two–speed electric drive for rocker-machines. Cand. Sc. (Tech.) Dissertation, 2003.
- Foursov E.A. Operation modes optimization of step electromagnetic drive for nuclear reactor clusters. Cand. Sc. (Tech.) Dissertation, 2003.

- Tret'yak G.A. Research and development of sensorless electric drive in the system «cyclo-converter – AC motor». Cand. Sc. (Tech.) Dissertation, 2003.
- Pavlenko C.V. Modernization of main electric drives of mine excavators. Cand. Sc. (Tech.) Dissertation, 2003.
- Ovsyannikov E.M. Electric drives of solar stations for earth and space basing. Dr. Sc. (Tech.) Dissertation, 2003..
- Ostrirov V.N. Development of the range of electronic converters for electric drives based on modern electronic components. Dr. Sc. (Tech.) Dissertation, 2004.
- Anouchin A.C. Development of control system of multi–phase switched reluctance drive with intermediate DC bus. Cand. Sc. (Tech.) Dissertation, 2004.
- Blagodarov D.A. Development of electric drive in the system «cyclo-converter – AC motor» for mine excavators. Cand. Sc. (Tech.) Dissertation, 2004.

Parthers

- JSC «Electroprivod», Moscow.
- JSC «All–Russian Research Institute of Electromechanics – VNIIEM», Moscow.
- ELDIN – Electric machine building plant, Yaroslavl.
- JSC «Mosenergo» (OZAP branch), Moscow.
- Moscow representation of «Siemens», Germany
- Moscow representation of «Schneider Electric «, France
- University of applied sciences (Fachhochschule), Kempten, Germany
- Ilmenau Technical University, Germany

Unique Equipment

- Universal bench for converters, motors and drive units testing at normalized net and load parameters.
- Heat–moisture chamber with device for vibro-strength and vibro-stability testing.
- Computerized bench for electric motors automated testing.
- Computerized bench for thyristor DC electric drives with microprocessor control.

DEPARTMENT OF ELECTRIC TRANSPORT

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The department has on its staff
15 lecturers,
11 research workers,
and 8 Ph.D. students

Head of Department:
Mikhail A. SLEPTSOV
Cand. Sci. (Tech.), Prof.

Main Lines of Research

Research supervisors

- **Development of electric drives for autonomous rolling stock**
  Sr. Resarcher V.I. Trofimenko, Ass. Prof. M.G. Kolobov
- **Development of electric equipment for street cars and trolley buses**
  Sr. Researcher V.A. Glushenkov
- **Development of electric power supply systems and traction substations for urban electric transport**
  Prof. M.A. Sleptsov, Assoc. Prof. G.P. Dolaberidze
- **Development of rail and special-purpose rolling stock**
  Sr. Researcher V.I. Trofimenko
- **Automatic control systems for trunk electric transport**
  Prof. V.D. Tulupov

Agreements, Contracts, Projects Supported by State Budget

- Creation concept development of electrical drives for public application transport with accumulators
- Integrated motor-generator facility for hybrid high velocity electrovehicle.
- Investigation of braking regimes of electric drives with induction motors and super capacitors for transport minisystems.
- Investigation of traction reversible convertor for city electic transport.
- Prospects for development of electric drives for transportation facilities with capacitive accumulators
- Development of traction electric equipment for trolley bus with IGBT controllers
- Development of traction drive for electrobus
- Development of traction electric equipment for rolling stock of urban electric transport
- Development of converter for traction electric drive of trolley bus
- Development of complete traction electric equipment for street car with lowered floor level
- Energy conversion efficiency increase at traction substations of ground urban electric transport
- Development and manufacturing of efficient electric drives on the base of induction motors for auxiliary needs of the rolling stock of the urban electric transport
- Development of environmentally benign efficient electric drives based on collectorless AC machines using advanced semiconductor devices
- Development of special-purpose electric equipment; assembly, testing, and assessment of energy performance of ER2S electric train experimental section
- Adjustment and bench testing of experimental sets of traction electric equipment with induction-motor electric drive for electrobuses and trolley buses

- Protection of DC cables for ground urban electric transport
- Development of induction-motor traction electric drives for electric cars
- Development and commercialization of power converters for use in induction-motor traction drives of different types
- Development of traction drive of linear induction motor for transport minisystem
- Development of electric truck using ZIL chassis (Bychok)

Key Publications

- Part 62. Electric transport. Savina T.I., Sleptsov M.A., Bajryeva L.S., Dolaberidze G.P., Prechissky V.A., Tulupov V.D. Electrotechnic directory, vol. 4, MPEI, 2002, p. 518-632.
- Arshba D.V., NovoselovO.V., Savina T.I. Investigation of substation convertors with mathematic models. MPEI, 2004,- p. 35
- Bajryeva L.S., Glushenkov V.A. Systems of automatic running start for electic transport. MPEI, 2004, -p. 35
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- Bajryeva L.S., Glushenkov V.A. Automatic control with resistor controller for electric transport. MPEI, 2002, -p. 16
- Bajryeva L.S., Glushenkov V.A. Impulsing non-automatic control for city electric transport. MPEI, 2002, -p. 16
- Dolaberidze G.P. Problems of energy efficiency of electric transport. MPEI, 2002, -p. 36
- Glushenkov V.A., Safronov A.V., Sleptsov M.A., Kaledin A.A. Traction drive for trolley bus with capacity accumalator. Papers of V International Conference «Electromechanics and Electrotechnics», ICEEE-2003, vol. 2, p. 159-161.Fedorovich V.S., Sleptsov M.A. Modern tendecies for development of city public transport (in Russian). Proc. of the V Intern. Conf. «Electromechanics and Electrotechnics», ICEEE-2003, Alushta,Ukraine, vol. 2, p. 149-150.
- Dolaberidze G.P. Analys of system 2x25 kV with criteria of energy efficiency (in Russian). Ibid, p. 162-163.
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- Safronov A.V., Amelkin A.V., Burakov P.L. Mathematical model of induction motor (in Russian). Ibid, p. 170-173.
- Experimental investigation of traction linear-inductor motor (in Rusian). GorelovA.T., Andrushin E.A., Kapustin N.I., Miroshkin I.G., Kolobov M.G. et.al. Ibid, p. 178-180.
- Basic factors of influance at secondery elements of traction liucar inductor motor (in Russian). GorelovA.T., Andrushin E.A., Miroshkin I.G. et al. Ibid, p. 174-177.
- Savina T.I. Implemantation of high-technologies at investigation of convertors (in Russian). Ibid, p. 210-212.
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- Il'insky Yu.A. Systems of control and diagnostics for electric equipment of passenger carriages (in Russian). Ibid, p. 227-230.
- Amelkin A.V. Development of induction electric drive for metropoliten trains (in Russian). Ibid, p.736-738.
- Tulupov V.D., Kiruhin U.A., Minajev D.V., Perevalova M.V. The effective system of traction electric drive for direct current trains (in Russian). Proc. of the II Intern. Symposium «Eltrans-2003, S.-Petrburgs, Finder-plus Publisher, 2003, p. 91-93.

- AmelkinA.V., Sleptsov M.A. Development of the mathematical model of inductor motor (in Russian). Vestnik gorodskogo elektricheskogo transporta Rossii, 2003, # 5, p. 25-30.
- Methods of increasing enregetic characteristics for electric trains (in Russian). Tulupov V.D., Karpov U.A., Nazarov A.S. et al. Zheleznodorozhnyi transport, 2003, # 6, p. 45-41.
- Glushenkov V.A., Sleptsov M.A., Kaledin A.A. Traction electric drive for trolley bus with capacitor (in Russian). Avtotraktornoe oborudovanie, 2004, # 1-2, p. 25-28.

Partners

- Dinamo Joint-Stock Electrotechnical Company, Moscow
- St Petersburg Trolley Bus Works, St. Petersburg
- Trolley Bus Works, Engels, Saratov Region, Russia
- Electrical Apparatus Works, Zaporozh'e, Ukraine
- Vologdaelektrotrans Company, Vologda, Russia
- Trans-Al'fa Company, Vologda, Russia
- Ratep Company, Serpukhov, Moscow Region
- Tatelektromash Company, Naberezhnye Chelny, Tatarstan, Russian Federation
- Mosgortrans State Company, Moscow
- Gorelektrotrans State Company, St. Petersburg
- Moscow Subway State Enterprise, Moscow
- Crosna Company, Moscow
- MosgortransNIIproyekt Research and Design Institute, Moscow
- State Unitary Enterprise Moscow Railroad, Moscow
- Locomotive Repair Works, Moscow
- Research Institute at Electrotyazhmash Works (KhZTM), Kharkov, Ukraine
- All-Russia Research and Design Institute of Electric Locomotive Making (OAO VElNII), Novocherkassk, Russia
- Scientific-and-Production Association Novocherkassk Works of Electric Locomotive Making (OAO NPO NEVZ), Novocherkassk, Russia
- Radiopribor Works, St. Petersburg, Russia
- Yuzhnoe Design Bureau (KB Yuzhnoe), Dnepropetrovsk, Russia
- Temp Scientific-and-Technical Center (NTTs Temp), Moscow
- VNIPTI AEP Dinamo, Moscow
- Research Institute of Urban Electric Transport, Moscow
- Elektrotransservis Technical Center Company, Moscow
- Tatra-Yug Joint Enterprise, Odessa, Ukraine
- Energiya Scientific-and-Production Enterprise, Moscow
- Agregat Production Association, Moscow

Unique Equipment

- Test bed for testing traction electric drives for trolley buses and motor-in-wheel transport
- Facility for physical simulation of electric drives with inertial mass for means of transportation
- Test bed for testing electric drives with switched-reluctance motors
- Test bed for simulation of the diesel-generator unit for motor-in-wheel automobiles
- High-voltage test bed for inspection and testing of power semiconductor devices

- Test bed for testing automobile electric drives
- Test bed for testing auxiliary high-voltage static converters for street car and trolley bus
- Facility for testing a motor compressor with induction motor for trolley bus or subway rolling stock
- Facility for testing electric drives of street cars and trolley buses
- Test bed for testing traction motors of street cars and trolley buses by the recuperation method
- Test bed for testing dc and ac electric drives for motor-in-wheel transport
- Test bed for testing traction drives of lunar vehicles and self-propelled carts
- Test bed for testing linear induction-motor drive
- Test bed for testing and debugging microprocessor control systems for ac and dc traction drives

DEPARTMENT OF ELECTRIC POWER SUPPLY OF INDUSTRIAL ENTERPRISES (ESPP)

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2 researchers,
16 Ph.D. students.

Head of the Department
Cand. Sci. (Tecxhn), Assoc- Professor Sergey Ф. TSIRIUCK

Main Directions of Scientific Researches

supervisors of studies

- **Automation of calculation-experimental researches of transients in the electric supply systems for industrial enterprises**
  Prof. Gamazin S.I.
- **Definition and prognosis of electric consumption parameters for modern enterprises and being under construction with optimization of set and repaired electric equipment structure**
  Prof. Kudrin B.I.
- **Electromagnetic compatibility of the powerful converting devices with industrial enterprises' electric supply systems**
  Assoc. Prof. Bure I.G.
- **Electric supply of industrial enterprises consumers from autonomous supplying sources**
  Assoc. Prof. Khevsuriani I.M.
- **Energy audit of industrial enterprises and electric nets**
  Assoc. Prof. Tsiriuck S. A.

Treaties, contracts, state budget themes

- Research of general regularity and stability of industry's electric economy development
- Research of regularity of industrial electric supply systems functioning at voltage failure
- Theoretical research and modeling of combined input filter in AC network
- Development of a theoretical base for researches inside industrial enterprises' electric supply
- Development of a theoretical base of the voltage regulation perspective methods creation in industrial enterprises' network
- Development of a theoretical base of the guaranteed electric supply creation for responsible industrial consumers
- Development of technical decisions on reliability increasing of high-voltage loading functioning at sub-stations «Nitrogen»
- A perspective planning of the electric equipment capital repair volume in order to reduce capital expenses
- Energy audit of power engineering equipment at «Ammofos» in order to reduce losses

Key Publications

- Bistritsky G.F. , Kudrin B.I. A choice and operation of power transformers (in Russian). Akademia Publisher, 2003. 176 p.
- Bistritsky G.F. Power equipment of industrial enterprises (in Russian). Akademia Publisher, 2003, 304 p.

- Kudrin B.I. About electric energy and power losses in electric circuits (in Russian). Elektrika. 2003. N3. p. 3-9.
- Kudrin B.I. About perspective researches of electric drive at MNLZ (in Russian). Elektrika. 2003. N9. p. 30-31.
- Kudrin B.I. Energy consumption in electric metallurgy (in Russian). Elektrika.2003. N9. p.35-45.
- Kudrin B.I. Comments to standard system changing (in Russian). Elektrika.2003. N3. p.42-44.
- Ancharova T.V., Pishchur A.P. Problems of regulation and electric energy expenses analysis at enterprises of middle and small power with multinomenclate producing (in Russian). Novye tekhnologii. 2003. N3, p.42-46.
- Ancharova T.V., Pishchur A.P. Analysis and electric consumption regulation for middle and small power enterprises with multinomenclate producing (in Russian). \\Vestnik MEI. MPEI Publisher. 2003. N2, pp.35-41.
- Gamazin S.I., Zelenskaya M.A. Calculative-experimental researches of admissible non-symmetric regimes regions in electric supply system lower 1000 V (in Russian). Elektrika,2003. N11, p.15-21.
- Perevalov S.G. Electric energy economy at the enterprises with twenty-four-hour technological process (in Russian). Elektrika,2003. N5, p.30-33.
- Bure A.B. Power hybrid filters for industrial networks and methods of their calculation (in Russian). Vestnik MEI, 2003. N6. Pp. 172-178.
- Gamazin S.I., Petrovitch V.A., Nikiforova V.N. Definition of factual contribution of consumer in distortion of quality parameters of electric energy (in Russian). Promyshlennaya energetika. 2003. N1 p.32-38.
- Kireeva E.A., Orlov V.V., Starkova L.E. Electric supply of industrial enterprises workshops. Energoprogress Publisher. 2003. 120 p.
- Kireeva E.A., Grigoriev V.I., Mironov V.A., Chokhonelidze A.N. Electric supply and electric equipment of workshops (in Russian). Energoatonizdat Publisher. 2003. 246 p.
- Kireeva E.A., Grigoriev V.I., Mintiukov A.P., Chokhonelidze A.N. Electric supply and electric equipment of living and public buildings (in Russian). Energoizdat Publisher. 2003. 212 p.
- Gamazin S.I., Tidzhiev M.O., Vasil'ev E.I. Expedient regimes of lead-in operation at different levels of electric supply system (in Russian). Promyshlennaya energetika. 2004. No 3, p.17-24.
- Bistritsky G.F., Abramkin V.P. Warming cables and their application (in Russian). Elektrika,N1. 2004. Pp. 19-24.
- Tsiriuck S.A. About tariffs for consumers (in Russian). Elektrika, 2004. N4. p.22-25.
- Tsiruck S.A., Kireeva E.A., Kondratiev A.V. Tariff politcy and electric energy consumers (in Russian). Elektrometallurgia, 2004. N6. p.36-40.
- Tsiruck S.A., Kireeva E.A. Increasing of technical and economical effecniveness of electric supply at metallurgy enterprises (in Russian). Elektrometallurgia,2004. N8. p.37-43.
- Kireeva E.A. Reference materials on electric equipment (workshop electric neworks, electric networks of living and public buildings) (in Russian). Energoprogress Publisher. 2004. 169 p.
- Reference book of electrician (in Russian). Kireeva E.A., Grigoriev V.I., Mironov V.A. et al. (under edit. of V.I. Grigoriev). Kolos Pyblisher. 2004. 746 p.
- Kireeva E.A. Reliability increasing of workshop electric supply systems (in Russian). Glavnyi energetik, 2004. N6. Pp. 30-39.

- Kireeva E.A., Grigoriev V.I., Mironov V.A., Chokhonelidze A.N. Inside-workshop distribution of electric energy (in Russian). Glavnyi energetik. 2004. N3. Pp. 30-39.
- Kireeva E.A. To the problem of power transformers aging (in Russian). Promyshlennaya energetika. 2004. N2, pp. 14-16..
- Kireeva E.A., Grigoriev V.I., Mironov V.A., Chokhonelidze A.N. Numerical relay and protection at electric workshop systems (in Russian). Glavnyi energetik. 2004. N7, pp. 17-26.
- Kireeva E.A., Grigoriev V.I., Mintiukov A.P., Chokhonelidze A.N. Protection in electric supply systems of public buildings. Glavnyi energetik. 2004. N5, pp. 23-27.
- Kireeva E.A., Grigoriev V.I., Mironov V.A., Chokhonelidze A.N. Electric energy economy in electric supply workshop systems (in Russian). Glavnyi energetik. 2004. N9, pp. 42-49.
- Kudrin B.I. Foundations of State plan of the Russian market electrification (in Russian). Elektrika,2004. N7, pp. 3-7; No. 8, pp. 13-30.
- Kudrin B.I. Scientific and practical problems of energy supply in the Promyshlennaya energetika journal (in Russian). Promyshlennaya energetika. 2004. N8. p.5-9.
- Kudrin B.I. Calculation and planning of electric consumption in rolling producing on the basis of principles of «price-logic» self-organization (in Russian). Proizvodstvo prokata, 2004. N11. p.34-47.
- Kudrin B.I. Renewable energy sources as a part of Russian market electrification conception (in Russian). Resursy. Teknologia. Economica.2004. N3, pp. 39-47; N4, pp. 8-19, N5, pp. 18-27.

Dissertations

- Zhilin B.V. Informative-methodological ensuring of electric consuption parameters determination at early design stages. Dr. Sci. (Techn) Dissertation, 2003.
- Beliaev S.E. Quantative parameters determination of the main group of electrical equipment for enterprises of the basic branch at investments base substantiation (on the example of ferrous metallurgy). Cand. Sci. (Techn) Dissertation, 2003.
- Lushnova A.N. Processes investigations recommendations development on decreasing of the negative effect of over-voltage after short circuit on the transformer block. Cand. Sci. (Techn) Dissertation, 2003.
- Al-Kanani Abdulkader Abdulkavi M. Electric energy economy in low-volt circuits of industrial enterprises. Cand. Sci. (Techn) Dissertation, 2003.
- Perevalov S.G. Analysis and methods of electric energy economy and of regulation of electric supply development at the enterprises with twenty-four-hour technological process (on the example of aeroation stations). Cand. Sci. (Techn) Dissertation, 2003.
- Slobodianiuk M.A. Determination of admissible non-symmetrical regimes region in the electric supply systems less 1 kV. Cand. Sci. (Techn) Dissertation, 2003.
- Soshnikov A.E. Determination methods of electric supply development for budget organizations for regulation on the basis of system energy audit (on the example of Russian Minzdrav organizations). Cand. Sci. (Techn) Dissertation, 2003.
- Nadzhib Salem Ali. Regulation of electric supply from transformers of the Al-Roda sub-station (Yemen). Cand. Sci. (Techn) Dissertation, 2003.
- Andombe Kosso Maks Gilen. Development of methods for parameters determination of repairing stream of cables with 6-10 kV for big industrial enterprises with the aim of increasing effectiveness of operating service. Cand. Sci. (Techn) Dissertation, 2003.
- Hassan Salman Hamad. Regimes modeling and analysis for apart and parallel lead-in operation on the different levels of the electric supply system. Cand. Sci. (Techn) Dissertation, 2003.

- Yaniushkin M.V. Organization of short-period prognosis of electric consumption parameters of the big industrial enterprises. Cand. Sci. (Techn) Dissertation, 2003.
- Pischur A.P. Analysis and regulation of electric supply of the small power enterprises with multinomenclate producing. Cand. Sci. (Techn) Dissertation, 2004.
- Loshakov A.A. System departmental regulation of electric consumption of organizations (on the example of Health Service Department of Russia). Cand. Sci. (Techn) Dissertation, 2004.

Partners

- JSC «Electroproekt», Moscow
- JSC «Moskvitch», Moscow
- Wroclav Polytechnical Institute. Electric machine systems Institute. Poland
- JSC «Voskresensk mineral fertilization», Voskresensk, Moscow Region
- AMO «ZIL», Moscow
- AK «Nitrogen», Novomoskovsk
- Ilmenau Technical University, Germany
- Western-Siberian metallurgical factory. Novokuznetsk
- ZAO «FosAgro AG»
- ZAO Interregional Agency of market of electric energy and power.
- («MARAM+»)

INSTITUTE OF POWER ENGINEERING

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Departments of the Institute

IPE DEPARTAMENT OF HIGHER MATHEMATICS (HM)

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The department has on its staff:
78 educators
1 Ph.D. students.

Head of Department:
Dr. Sci. (Phyc-Math) , Professor,
Member of the International Academy of Informatization
Igor M. PETRUSHKO

Main Lines of Research

Research supervisors

- **Partial differential equations**
  Prof. Petrushko I.M.
- **The homologous and structural theory of rings and the arithmetic properties of analytical functions values**
  Prof. Tuganbaev A.A., Assoc. Prof. Yanchenko A.Ya.
- **Branching processes in random environment**
  Prof. Afanasyev V.I.
- **Harmonic analysis, coding theory, approximations**
  Prof. Yudin V.P.
- **Functional analysis**
  Prof. Kirillov A.I.
- **Development of methods for asymptotic integration of singularly perturbed differential, integral, and integro-differential linear and nonlinear equations systems**
  Prof. Prohorenko V.I., prof. Safonov V.F., prof. Bobodzhanov A.A.
- **Infinite-order nonlinear differential equations and corresponding Banach spaces**
  Prof. Balashova G.S.
- **Inverse problems for differential equations**
  Professor Barashkov A.S.
- **Quantum theory of motion and radiation of charged relativistic particles in electromagnetic fields**
  Professor Kholomai B.V.

Agreements, Contracts, Projects by State Budget :

- Some problems of qualitative theory of differential equations and extremal problems of the functions theory.
- Investigation of non-classical problems for partial differential equations in weight spaces.

Key Publications

- *Petrushko I.M., Chernykh E.V.* On parabolic equations of second order with non-constant time direction (in Russian). Vestnik MEI, № 6, 2003, pp. 85-94.
- *Tuganbaev A.A.* Multiplication modules. Journal of Mathematical Sciences (New York), 2004, Vol. 123, № 2, pp. 3839-3905.
- *Bobodzhanov A.A,, Safonov V.F.* Time-inversed singulary excited integral-differential equations with diagonally kernel singularity (in Russian). Differentsial'nye uravnenia. 2004. Vol. 40, No.1. Pp. 112-120.

- *Gushchin A.K.* Carlessonian type solutions evaluation for the second-order elliptical equation (in Russian). Doklady RAN. 2004. No. 3. Pp. 15-18.
- *Yudin V.A.* About positive values of spherical harmonics and trigonometric polynomials (in Russian). Matemeticheskie zametki. 2004, No. 3. pp. 476-480.

Partners

- Lomonosov Moscow State University (MGU), Moscow
- Steklov Mathematical Institute, Russian Academy of Sciences, Moscow
- Moscow State Social University (MGSU), Moscow
- Kurchatov Institute Russian Scientific Center (RNTsKI), Moscow

IPE DEPARTMENT OF ELECTRICAL POWER STATIONS

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The department has on its staff
14 teachers,
5 researchers,
11 Ph.D. students.

Head of the Department
Ph.D. (Techn), Professor Vladimir A. STARCHINOV

■ DIRECTIONS of SCIENTIFIC RESEARCHES

The scientific chiefs

- **Power stations control in normal and emergency operation**
  prof. Vasin V.P.
- **The coordination and optimization of short-circuit currents levels**
  Prof. Neklepaev B.N.
- **Operation regimes and diagnostic of the basic electrical equipment of power stations and substations**
  Prof. Starshinov V.A.
- **Short-circuits and transient processes in AC and DC electrical installations; automation of electrical installations designing .**
  Sr. Llecturer Gusev Y.P.

■ The contracts

- Main directions development of short-curcuit currents coordination levels with the purpose of Russian Uniform Power System (UPS) reliability increasing
- The software for calculation a short-circuits in AC electrical installations with voltage below 1 kV
- The software development for calculation a short-circuit currents in an operative DC grid of substations and power stations
- The software for the automated design documentation system of secondary circuits of a distribution device (DD) elements
- The software for automation of engineer – electrician operations
- The development of the automated chief TAI workplace
- The development and creation of the training complexes for the personnel preparation
- The research and analysis of the protective means operation for DC operative circuits
- The software for a calculation a short-circuits in AC and DC electrical installations with voltage below 1000 V and a calculations of induction motors self-start with voltage 6 kV
- The computer-aided design system and expert estimation of DC electrical installations of electrical stations and substations
- The development of high-performance means of a reliability increasing for the capital TPS equipment operation
- The development and research of perspective high-speed gas-turbine generating units
- The creation of the new generation of reactors and high-reactance current distributors on a basis of special magnetic concrete for limitation a short-circuit currents
- The optimization and levels coordination for short-circuit currents in electrical power systems
- The development of theoretical bases and means of an electrical installation diagnostics of own needs power stations and substations elements

- The development of the calculations software for selectivity of protective devices in operative DC circuits
- The development of a hardware-software complex for testing an operative DC circuits of substations
- The optimization of operation regimes of the TPS electrical equipment
- The increasing of an equipment operation reliability in origin of emergencies
- The development of a hardware-software complex for automated diagnostics of a storage batteries condition

Publications

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Dissertations

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Partners

- FSK EES (Federal nets company of RAO EES)
- Joint-stock company «Mosenergo», Joint-stock company «FSK EES»
- Posenergoatom Concern, Moscow
- Novovoronezh NPP
- ORGRES Company, Moscow

Unique Equipment

- An educational power station of 2 150 kW power – full-scale physical model of an electrical part of a thermal power station

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The department has on its staff
23 teachers,
26 researchers,
32 Ph.D. students

Head of the department
Doctor of Technical Sciences,
Associate professor
Sharov Yuri V. SHAROV

Basic directions of scientific research

- **Methods and means for economic, reliable and stable electrical power systems (EPS) operation.**
  Assoc.Prof. Sharov Yu.V.
- **Methods and means of EPS stability inprovement.**
  Prof. Stroev V.A.
- **Scientific basis for optimization of the structure, parameters and operating conditions of EPS.**
  Assoc. Prof. Shul'zhenko S.V.
- **Development of EPS automatic control systems.**
  Assoc. Prof. Filipova N.G.
- **Methods and means of ensuring EPS reliability.**
  Prof. Fokin Yu.A.
- **The use of electric energy storage devices for improving economic and reliable EPS operation.**
  Sr. Researcher Nikitin D.V.
- **Development of structure and methods of the interconnection of United Power System of Russia with power system of European countries.**
  Sr. Researcher Syromiatnikov S.Yu.
- **Electromagnetic compatibility of technical devices and power quality.**
  Sr. Researcher Kartashev I.I.
- **Means for electrical energy saving.**
  Prof. Zuev E. N.
- **Automation of operation and repairs in distribution electrical networks.**
  Sr. Researcher Ponomarenko I. S.
- **FACTS on the basis of valve operated static devices.**
  Prof. Bryantsev A. M.

Contracts, state supported researches:

- Analysis of EPS operating conditions under the disturbances and quick-operating automatic load transfer affect on it.
- Analysis of operating conditions in EPS containing controlled reactors on physical and mathematical models. Analysis of controlled reactor's operational characteristics and its application in high-voltage networks.
- Analysis of controlled complex EPS mathematical models. Transients and transient stability calculation algorithm development.
- Creation of EPS elements mathematical models catalogue.
- 6-10/0.4 kV electric power supply system projects optimization.
- Development of the EPS transient stability step-by-step management theory.
- FACTS parameters selection methods development. FACTS operating condition characteristics in complex EPS research.

- Development of the complex methods analysis for electric power supply system containing distorting load on condition of devices power quality and electromagnetic compatibility maintenance.
- Inspection of «Kuban'energo» electrical network and its structure, consistence and operating conditions analysis.
- Inspection of Bratsk Aluminum Plant electrical network. Analysis of higher harmonics content in its electrical network, technical means on power quality improvement working out.
- Multi-criteria optimization of high-voltage input power in big cities taking into account load growth.

Key Publications

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Partners

- Mosenergo Utility Company, Moscow, Russia
- RAO EES Rossii (Unified Energy System of Russia) Joint-Stock Company, Moscow, Russia
- Glavenergonadzor RF (Chief Energy Inspection of the Russian Federation), Moscow, Russia
- State Center of Standardization, Certification, and Metrological Support in the Field of Electromagnetic Compatibility (GTsMO), Moscow, Russia
- European Commission: Project PL-962140 INCO—COPERNICUS, Moscow
- Electrical Power Research Institute (VNIIE), Moscow, Russia
- Energoset'proyekt Power Network Design Institute, Moscow, Russia
- State Unitary Enterprise «Lenin All-Russia Electrotechnical Institute» (GUP VEI), Moscow, Russia

Unique Equipment

- Electrodynamic model of an electrical power system
- Automated system of dispatching control of distribution networks (technical means and software support)
- Automated metering and billing system (technical means and software support)
- Instruments and systems for control and analysis of the quality of electrical power

DEPARTMENT OF HIGH VOLTAGE ENGINEERING AND ELECTROPHYSICS

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The department has on its staff
23 lecturers,
25 researchers,
10 Ph.D. students

Head of Department
Alexey V. Kalinin
Cand. Sci. (Tech.), Professor

Main Lines of Research

Research Supervisors

- **Investigations of high voltage electric discharges**
  Prof. I.P. Vereshchagin, Assoc. Prof. A.A. Beloglovsky
- **Lightning protection of power plants**
  Prof. I.P. Vereshchagin, Assoc. Prof. A.G. Temnikov
- **Overvoltages and electromagnetic compatibility in electric power systems**
  Prof. B.K. Maximov
- **Investigation of the processes and methods of internal insulation designing**
  Prof. I.M. Bortnik, Assoc. Prof. Yu.S. Pintal
- **Lightning protection of buildings and objects**
  Assoc. Prof. I.P. Kuzhekin
- **Industrial and technological application of high electric fields and electric discharges**
  Prof. I.P. Vereshchagin, Prof. S.A. Krivov
- **Environmental problems of energetic**
  Prof. B.K. Maximov, Prof. I.P. Vereshchagin

Agreements, Contracts, Projects Supported by State Budget

- Application of surge arresters for lightning protection of transmission lines and substations
- Experimental investigations of the streamer stage of gas discharge
- Investigations of overvoltages and development of recommendations for their limitation in low- and medium-voltage distribution networks of power plants
- Improvements of lightning protection of long distance 500-1150 kV transmission lines on the basis of refined physical concepts of lightning discharges
- Development of a low-frequency method for the diagnostics of the power transformers insulation
- Development of physical-mathematical models of electric discharge stages in gases
- New technologies based on nanosecond pulse discharge
- Development of physical and mathematical models of lightning discharge as an element of a global electric circuit for the prediction of its effect on the biosphere
- Development of environmental protection technologies involving the use of electric discharges
- Lightning protection and tests
- Investigation of generation and development of discharges in charged aerosol clouds
- Creation of a data-base on experimental characteristics of pulse corona discharge

- Development of typical program and a complex monitoring method for power transformers
- Development of environmental protection technologies based on electric discharges
- Electromagnetic compatibility of nuclear power objects

Key Publications

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- Electromagnetic compatibility in power industry and electrical engineering (in Russian). D'yakov A.F., Maximov B.K., Borisov R.K. at all,Energoatomizdat Publisher, 2003. 768 p.
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Partners

- State Unitary Enterprise «Lenin All-Russia Institute of Electrical Engineering» (GUP VEI), Moscow
- Ivanovo State Technical University (IGEU), Ivanovo, Russia
- Krzhizhanovskyi State Institute of Energy Research (ENIN), Moscow
- Electrical Power Research Institute (VNIIE), Moscow
- IVTAN (Institute of High Temperatures) Scientific Association, Russian Academy of Science, Moscow
- Tomsk Polytechnic University, Tomsk, Russia
- Novosibirsk State Technical University (NGTU), Novosibirsk, Russia
- St. Petersburg State Technical University (SPbGTU), St. Petersburg
- State University, Tokyo, Japan
- University of Technology, Karlsruhe, Germany
- University of Technology and Economics, Budapest, Hungary
- University of Technology, Dresden, Germany
- University of Technology, Eindhoven, The Netherlands
- Tsinghua University, Beijing, People's Republic of China

Unique Equipment

- Complex of high voltage high current facilities
- High frequency generator
- Charged aerosol generator

DEPARTMENT OF RELAY PROTECTION AND AUTOMATION OF ELECTRICAL POWER SYSTEMS

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The department has on its staff
20 lecturers,
3 research workers,
and 19 Ph.D. students

Head of Department:
Anatolii F. D'YAKOV
Dr. Sci. (Tech.), Prof.,
Corresponding Member of the Russian Academy of Sciences

Main Lines of Research

Research supervisors

- **Development of theoretical principles and realization of integrated microprocessor systems of relay protection, control and testing of power facilities at superhigh voltages of 330—750 kV**

  Prof. A.F. D'yakov
- **Development of methods and principles oof training simulators and automatic training systems creation for relay protection and automation of electrical power systems**

  Prof. A.F. D'yakov, Assoc. Prof. V.V. Krivenkov
- **Microprocessor systems of relay protection and automation**

  Assoc. Prof. V.V. Babykin, Assoc. Prof. Yu.A. Barabanov, Assoc. Prof. A.N. Vasil'ev
- **Software for the calculation of short-circuit currents and computer-aided design systems for relay protection**

  Assoc. Prof. Yu.A. Barabanov
- **Electromagnetic compatibility of microprocessor systems of relay protection and automation**

  Prof. B.K. Maksimov, Assoc. Prof. Ya. L. Artsishevskii
- **Development of integrated procedures of equipment application for fault location in power transmission lines**

  Assoc. Prof. Ya.L. Artsishevskii

Agreements, Contracts, Projects Supported by State Budget

- Development of simulation methods for electricity supply systems and structures for their emergency control
- Development of the integrated microprocessor control systems theory for power facilities, along with the methods of raising the accuracy of energy accounting and of monitoring the parameters of power supply of relay protection and telecontrol devices
- Elaboration of engineering solutions aimed at developing a miniature cogeneration power plant at a site of Spetsstroi Rossii (Russian Special-Purpose Construction Agency)
- Scientific and methodological validation of the electrical part and control system for superlow-power (5 MW and less) energy sources
- Theoretical and practical principles of integrated microprocessor control systems for power facilities
- Development of standards and procedures for design and operation of power facilities proceeding from the principle of electromagnetic compatibility
- Development of automatic training systems and training simulators for relay protection and automation of electrical power systems

Key Publications

- Electromagnetic compatability in electrical power engineering and electrical enguineering (in Russian) / D'yakov A.F., Maximov B.K., Borisov КюЛю ye al. Under ed. A/F/ D'yakov. Energoatomizdat Publisher, 2003.
- Fedoseev A.M. Relay protection of electrical power systems (in Russian). MPEI Publisher. 2004.
- D'yakov A.F., Platonov V.V. United electrical power system of Russia in the period of market transformation (in Russian). MPEI Publisher, 2003.
- Barabanov Yu.A. Software package TKZ-MEI (in Russian). Proc. of the conf. «Relay Protection and automatics of power systems». VVTS-Publisher, 2004, p. 18-20.

Dissertations

- Shevtsov M.V. Research and development of algorythms for an adaptive protection operation against all types of short-circuits on the base of distant priciple. Cand. Sci (Tech.) Dissertation, 2003.
- Nalevin A.A. Research and development of adaptive algorithms for detection and elimination an asynchronous regime for usage in microprocessor against-accidents automatics of the power electrical systems. Cand. Sci (Tech.) Dissertation, 2003.
- Gorina O.V. Relay protection modernization for shunting reactor of ultra-high voltage. Cand. Sci (Tech.) Dissertation, 2003.

Partners

- OAO Institut Energoset'proyekt (power system design institute), Moscow
- Unified Dispatching Control Board of Electrical Power Systems of the Center of Russia (ODU Tsentra), Moscow
- Research Institute of Pulse Technologies (NIIT), Moscow
- Central Dispatching Control Board of the Unified Power System of Russian Federation (TsDU EES RF), Moscow
- Radius scientific-and-production company, Zelenograd, Moscow Region
- OOO Stroipodstantsii (substation construction company), Moscow
- ORGRES Company, Moscow
- OOO NPO Energoprom-inzhiniring (scientific-and-production company in the field of power engineering), Moscow

Unique Equipment

- Test desk for the testing and tuning of automatic synchronizers for the connection of high-power synchronous generators for parallel operation with an electrical power system
- Software package for computer-aided design of relay protection devices

THE DEPARTMENT OF NON-TRADITIONAL AND RENEWABLE ENERGY SOURCES (NRES)

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18 Teachers,
2 Researchers
16 Ph.D. students

Head of the department Dr. Sci. (Techn),
Professor Leonid N. DUDCHENKO,
corr. – member of Russian Academy
of Electrotechnical Sciences

The major directions of scientific researches

Research guides

- **Theory and methods of substantiating the parameters of plants and systems on the basis of renewable energy sources**
  Prof. Vissarionov V.I., prof. Malinin N.K.
- **Theory and methods of substantiating the operating modes of plants and systems on the basis of renewable energy sources in decentralized and centralized power supply systems.**
  Prof. Vissarionov V.I., prof. , Malinin N.K.
- **Ecological aspects of utilizing of renewable energy sources**
  Prof. Vissarionov V.I., prof. Malinin N.K.
- **Development of the optimum control methods for hydroelectric power station cascades considering social-ecological requirements.**
  Prof. Aleksandrovskyi A.Y.
- **Seismic safety of hydraulic engineering structures.**
  Prof. Dudchenco L.N., prof, Marchuk A.N.
- **Developing the theoretical foundations of operational modes optimization and controlling systems development for AC-machines and units from them on the basis of non-traditional and renewable energy sources**
  Prof., Tsgoev R.S.
- **Projects management for creating complicated technical-organizational systems on the basis of methods and means of information and automation of project solutions.**
  Prof. Tiagounov M.G.

Agreements, contacts, state budget topics

- The development of the effectivaness calculation methods of energy utilizing of different purpose storage pools in Russian regional power industry with the help of small hydropower industry.
- The development and creating of theoretical bases of substantiating the wind-diesel systems at the Russian regions with energy short supply.
- Researches on creating standard power supply modules by using non-traditional energy sources for application in robotics systems.
- The development, creating and research of floating aeration plants powered by solar photoelectric batteries.
- The development of methods and software for programming provision of electrical energy manufacture by Russian hydro power stations

- The development of evaluating methods of energy potential of storage pools for an economic purpose.

Main publications

- ***Power*** equipment for using of non-traditional and renewable energy sources (in Russian) / Vissarionov V.I., Belkina S.V., Deryugina G.V. et al. Edited by V.I.Vissarionov // VIEN Publisher. 2004. 448 p.
- ***The principles*** of modern power engineering. Part 2. Modern electrical power engineering / Edited by E.V. Ametistov. Chapter 17. Hydro power engineering and other renewable sources of energy (in Russian)/ V.I.Vissarionov // MPEI Publisher. 2003. p. 397-425, 435-452.
- ***V.I.Vissarionov et al.*** Using of renewable energy sources in Siberia and Far East for improving of environmental quality // Information bulletin «Renewable energy». Intersolarcenter Publisher. 2003. p. 14-17.
- ***Wave*** energy / Vladimir I.Vissarionov, Valery V. Volshanik // Encyclopedia of life support systems. http://greenplanet.eolss.net/Eolss-Long/mss/cob/E3-08/E3-08-04TXT.aspx. p.14
- ***Economics*** of wave power production / V.V. Volshanik, N.K. Malinin // Encyclopedia of life support systems. http://greenplanet.eolss.net/Eolss-Long/mss/cob/E3-08/E3-08-04TXT.aspx. p.11.

Partners

- Joint-Stock Company «Institute Hydroproject», Moscow;
- Joint-Stock Company «Research and Development Institute of power installations», Moscow;
- All-Russian Research and Development Institute of Agricultural Electrification, Moscow;
- Constanz Technical High school, Germany.

Unique equipment

- Floating aeration plant powered by solar batteries.

DEPARTMENT OF THEORETICAL FOUNDATIONS OF ELECTRICAL ENGINEERING

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The department has on its staff
24 lecturers
3 Ph.D. students

Head of Department:
Pavel A. BUTYRIN
Dr. Sci. (Tech.), Prof.,
Corresponding Member
of the Russian Academy of Sciences

Main Lines of Research

Research supervisors

- **The strategy of power industry development in Russia. The effect of power industry on the global climate**
  Academician K.S. Demirchyan
- **The theory of adaptive electrodynamic systems. Simulation of electrodynamic systems**
  Academician K.S. Demirchyan, Prof. P.A. Butyrin
- **Diagnostics of electrodynamic systems**
  Prof. P.A. Butyrin, Prof. M.E. Alpatov
- **The theory of discrete-analog and digital systems**
  Prof. V.G. Mironov
- **Microwave-frequency electrical engineering**
  Prof. L.V. Alekseichik, Assoc. Prof. F.N. Shakirzyanov
- **Nonlinear electrodynamics**
  Prof. G.G. Gusev, Assoc. Prof. V.V. Karataev
- **Electrodynamics of giant energies**
  Assoc. Prof. F.N. Shakirzyanov

Agreements, Contracts, Projects Supported by State Budget

- Development of the theory of adaptive electrodynamic systems
- Investigation and testing of a prototype of the superconducting current limiter.
- Mathematical simulation of processes in electric systems in the presence of the superconducting current limiter
- Development of theoretical principles of employing virtual and information environments in the field of power generation and electrical engineering
- Researches on development of quality control methods for electric power, technical conditions and functional readiness of military techniques under the influence of destabilizing factors

Key Publications

- Automatization of physical investigations and experiments: computer measuring and virtual instruments based on LabVIEW (in Russian). / Alexeichik, L.V., Butyrin, P.A., Vaskovskaya ,T.A. et al., DMK-Press Publisher, 2005, 264 p.
- Mironov, V.G. The methods of the synthesis of two-dimension digital-analog signal processing systems (in Russian), Elektrichestvo, 2003, no. 7.
- Mironov, V.G. The principles of the design of digital-analog signal processing systems (in Russian), Elektrichestvo, 2003, no. 10.

- Tolcheev, O.V., Ziubin, P.A., and Ziborov, B.N. Technical criterions as the foundation of the regional industrial power supply programs (in Russian), Energeticheskaya politika, 2003, no 4, p. 14-18.
- Butyrin, P.A., Chin Hung Lian, and Kiselev, A.N., Generalized L.R. Neuman`s method as an effective instrument for solving a problem of synthesis of optimal control for valve transformer (in Russian), Izvestia RAN, Energetika. 2003, no 2, p.146-151.
- Kiselev, A.N., Optimization of digital signal processing of active current filter (in Russian), Electrotekhnica, 2003, no 10, p. 60-62.
- Karataev, V.V. and Milsky, K.V., Analysis of short-circuit processes in the system containing superconducting current limiter based on the program development environment LabVIEW (in Russian), Proc. of the Intern. Informatization Forum, Moscow. MFI Publisher, 2003, v.1, p. 95-98.
- Butyrin, P.A., Vaskovskaya ,T.A., Karataev, V.V., Materikin, S.V., and Shatunova, O.A., Thirty lectures on LabVIEW 7– training course structure principles (in Russian), in Papers to the International scientific-and-practical conference on educational, scientific, and engineering applications of LabVIEW, Moscow, 2003, p. 3-6.
- Karataev, V.V., Materikin, S.V., and Shakirsyanov, F.N., Real nonlinear elements in virtual LabVIEW circuits (in Russian), Ibid, p. 214-217.
- Mironov, V.G., An analysis rationalization of digital signals processing (in Russian), Ibid, p. 73-76.
- Mironov, V.G., Synthesis of two-dimension integral digital-analog signal processing systems (in Russian), Ibid, 77-81.
- Mironov, V.G., Digital-analog interfaces and one-dimension and two-dimension signal processing systems (in Russian), Proc. of the V Intern. Conf. on digital signal processing and applications, DNTORES Publisher, 2003, v.1, p. 167-168.
- Mironov, V.G., Self-value matrix problem in design and using of one-dimension- and two-dimension signal processing systems (in Russian), Ibid, p. 149-151.
- Tolcheev, O.V. and Ziborov, B.N., Particularities of power equipment function in Mosvodokanal water-pumping stations (in Russian), Energomanager, 2003, no 29/30, p. 22-24.
- Shakirzyanov, F.N. Molecular theory of stability of the globe-lightning (in Russian), Proc. of the XII Intern. Conf. on spin electronics and gyrovector electrodynamics, Moscow, 2004, p. 684-686.
- Shakirzyanov, F.N., Kitaitzev, A.A., and Puchkov, I.S. Electrical filters with distributed parameters (in Russian), Ibid, p. 681-683.
- Shakirzyanov, F.N., The nature of the globe-lightning (in Russian), Proc. of the V Intern. Conf. on Atmospheric Electricity, Vladimir, 2003, p. 684-686.
- Kiselev, A.N., Optimal control synthesis for the valve transformer (in Russian), Proc. of the IV Intern. school-seminar BICAMP, S.-Petersburg, 2003, p. 84-86.
- Butyrin, P.A., Vaskovskaya, T.A., and Rubtzov, A.A., Computer diagnostics (in Russian), Vestnik Yuzhno-Ulalskogo Gos. Univers., Cheliabinsk, 2003, p. 123-127.
- Butyrin, P.A. and Kiselev, A.N., Optimal control synthesis for the valve transformer (in Russian), Ibid, p. 112-115.

Partners

- Russian Academy of Sciences, Division of Energetic, Mechanics, Mechanical Engineering, and Control Processes, Moscow.
- Elektrozavod company (manufacture of electrical equipment), Moscow.

- Center of Environmental Studies of Khrunichev Works (aircraft design and manufacture), Moscow.
- Kurchatov Institute Russian Scientific Center (RNTs KI) (atomic energy research), Moscow.

Unique Equipment

- LabVIEW hardware/software complex

INSTITUTE OF AUTOMATIC AND COMPUTER ENGINEERING (IACE)

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Oleg S. KOLOSOV
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Member of International Academy of Informatization

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Departments of the Institute

- **Department of Control and Informatics .....**
- **Department of Computer Engineering .....**
- **Department of Information-Measurement Technique**
- **Department of Electrical Physics .....**
- **Department of Applied Mathematics .....**
- **Department of Computers, Systems and Networks..**
- **Department of Mathematical Modeling.....**
- **Department of Electrical Engineering and Introscopy.....**

IACE DEPARTMENT OF CONTROL AND INFORMATICS

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The department has on its staff
27 lecturers,
21 research workers,
and 23 Ph.D. students

Head of Department:
Oleg S. KOLOSOV
Dr. Sci. (Tech.), Prof.
Active Member of International
Academy of Informatization

Main Lines of Research

Research supervisors

- **Development of mathematical models and control algorithms for sophisticated systems**

  Prof. O.M. Derzhavin

- **Development of mathematical methods for programmable automation and design of non-linear dynamic systems and processes**

  Prof. O.S. Kolosov

- **Development of information on-line technologies on the base of neural networks and self-organizing systems principles**

  Prof. G.F. Filaretov

- **Development of automatization means on the base of modern programmable controllers; optimization and simulation of dynamic systems**

  Prof. M.V. Kolomeitseva

- **Development of adaptive and optimal algorithms for control of large scale dynamic systems**

  Prof. S.V. Egorov

- **Development of methods for decision making support on the base of statistical analysis of heterogeneous data. Development of cryptographic methods**

  Prof. V.P. Borodiuk, Assoc. Prof . G.A. Fomin

Agreements, Contracts, Projects Supported by State Budget

- Development of hardware and software tools for investigation of linear and non-linear control objects
- Development of algorithms for synergetic control of non-linear dynamic systems
- Development of methods for simulation and optimization of dynamic systems on the basis of experimental data
- Development of synthesis methods of artificial neural networks for detection of spontaneous variation in characteristics of stochastic processes
- Development of parametric and structural identification algorithms for linear systems
- Development of mathematical algorithms and software tools for imitation simulation of continuous dynamic systems with interval uncertainty
- Development of methods for decision support systems on base of statistical analysis of heterogeneous data

Key Publications

- Fomin G.A. Grounds for Opinions on the Resourses Usage Effectiveness for Decision Making Problems (in Russian). *Vestnik MPEI*, 2003, no.3, pp. 28-32.
- Anisimov D.N., Kolosov O.S., Nikishin A.F., Spiridonov D.K. Structural Identification of Dynamic Objects with Several Non-linearities (in Russian). Proceedings of International Conference «Identification of Systems and Problems of Control «. IPC Publisher, 2003, pp. 94-99.
- Kabanov V.A. Self-Organizing Neural-Dynamic Control Systems (in Russian). Vestnik MPEI, 2003, no.3, pp. 32-38.
- Kolomeitseva M.V., Mitrofanov V.E., Pikhletskiy V.E. Synthesis of Adaptive Non-linear Objects Control Systems with Standard Structural Schemes (in Russian). Proceedings of International Conference «Information Means and Technologies». MPEI Publisher, 2003, Vol. 2, pp. 94-97.
- Filaretov G.F., Boyan G. Using of Artificial Neural Nets for Compression of Stochastic Signals (in Russian). Proceedings of Conference «Sensors and Transformers in Control Systems». MIEM Publisher, 2003, pp. 94-99.
- Borodiuk V.P., Primenko V.A., Tulskii S.A. Generators of Pseudorandom Sequences in Information Protection Systems (in Russian). Vestnik MPEI, 2004, no.1, pp. 21-27.
- Nekrasov I.V., Tolcheev V.O. Modification of Nearest Neighbor Method with Using of Supporting Points for Text Categorization (in Russian). Vestnik MPEI, 2004, no.1, pp. 28-33.

Dissertations

- Boyan G. Using of Auto-Associative Artificial Neural Nets for Compression of Stochastic Signals. Cand. Sci. (Tech) Dissertation. 2003.
- Spiridonov D.K. Research and Development of Methods for Structural and Parametric Identification of Dynamic Objects with Several Non-linearities. Cand. Sci. (Tech) Dissertation. 2004.
- Dombrovskii V.V. Research and Development of Imitating Model of Small Hydroelectric Power Station for Control Problems Solutions. Cand. Sci. (Tech) Dissertation. 2004.

Partners

- Institute of Radio Engineering and Electronics (Russian Academy of Science), Moscow
- JSC «MOSENERGO», Moscow
- «MOSVODOKANAL» Company, Moscow
- Scientific-Industrial Association «MOSSPETSAVTOMATIKA», Moscow
- Ilmenau Technical University (Germany)
- Chemical-Technology University, Pardubice, Czech Republic

Unique Equipment

- Software Tools for Design and Investigation of Neural Nets
- Hardware and Software Tools for Scientific Investigation Automation and Sophisticated Dynamic Systems Testing
- Set of equipment for on-line research of sophisticated dynamic systems with several non-linearities
- Special Technological Equipment for Design, Simulation and Identification of Control Systems for Technological Purposes

IACE DEPARTMENT OF COMPUTER ENGINEERING

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The department has on its staff
25 lecturers,
5 research workers,
and 10 Ph.D. students

Head of Department:
Victor V. TOPORKOV
Dr. Sci. (Tech.), Prof.

Main Lines of Research

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

Agreements, Contracts, Projects Supported by State Budget

- The complex of models, methods, analysis and optimization means for scalable computer systems
- Methods and hardware means for hardware/software co-design
- Methods and tools for knowledge integration for products infomational model creation in CALS-technologies
- Steganographic methods for special applications
- Methodology and tools development for automated research of hardware/software tools for academic and research activity
- Regularization of formal-heuristic procedures for analysis and synthesis of complex systems
- High-level digital systems synthesis based on UNIX-platforms
- Digital systems synthesis on the base of modern programmable VLSI of arbitrary logic. Development of algorithmes and CAD parts for VLSI of arbitrary logic.
- Research of elements, CAD systems, and creation methods of high-speed systems for information analysis and transfer on the base of dynamically reconfigured FPGA

- Research and debugging of methods for software modules (written in universal languages) encapsulation for databases control systems
- Reasoning in intelligent systems

Key publications

- Toporkov V.V. Models of Distributed Computations (in Russian). Moscow: FIZMATLIT, 2004. 320 p.
- Vagin V.N., Golovina E. Yu., Zagoryanskaya A.A., Fomina M.V. Reliable and Plausible Reasoning in Intelligent Systems (in Russian). Moscow: FIZMATLIT, 2004. 704 p.
- Toporkov V.V. Recurrent schemes for forming and choice of system alternatives on the basis of operational models // Cybernetics and Systems Analysis, Kluwer Academic / Plenum Publishers, USA, 2004, №3, No. 3, p. 168-178.
- Toporkov V.V. Optimization of resource allocation in hard-real-time environment // Journal of Computer and systems Sciences International, 2004, vol. 43, No. 3, p.383-393.
- Toporkov V.V. Decidability of the analysis problem for dataflow models of programs // Programming and Computer Software, 2003, vol. 29, No. 3, p. 121-129.
- Toporkov V.V. Recurrent schemes for the synthesis of design decisions // Journal of Computer and Systems Sciences International, 2003, Vol. 42, No. 2, p. 289-295.
- Dissertations
- Komarov A.N. Research and development of associative environments and processing methods. Cand. Sci. (Tech.) Dissertation. 2004.
- Nassir Uddin M. A relational model development for security systems design. Cand. Sci. (Tech.) Dissertation. 2004.
- Polyachkov A.V. Network controllers based on an associative environment with superposition of control, storage and processing functions. Cand. Sci. (Tech.) Dissertation. 2003.
- Arakcheev P.A. Distributed environment organization for implementing of learning algorithms in neural networks. Cand. Sci. (Tech.) Dissertation. 2003.

Partners

- TIMA Laboratory, Grenoble, France
- Russian Academy of Sciences
- Moscow State Lomonosov University
- Ilmenau Technical University, Germany
- Russian Ministry of Defense

Unique Equipment

- Vantage Spreadsheet logic simulator
- Synopsys high-level synthesis tools
- MAXPlus II, Foundation Series tools for FPGA design
- GSSS tools for structure synthesis
- MASS dynamical systems simulator
- ProENGINEER PDM-system

IACE DEPARTMENT OF INFORMATION AND MEASUREMENT TECHNIQUE

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The department has on its staff
23 lecturers,
4 Ph.D. students

Head of Department:
Igor N. ZHELBAKOV
Dr. Sci. (Tech.), Prof.
Corresponding member of Academy
of Electrotechnical Sciences

Main Lines of Research

Research supervisors

- **Means of measurements on the basis of digital signal processing**
  Prof. I.N. Zhelbakov
- **Research of functioning and measuring possibilities of delta-sigma ADC**
  Prof. V.I. Didenko, Assoc. Prof . Yu.S. Solodov
- **Diagnostics of power transformers**
  Prof. V.N. Malinovsky
- **The analysis and synthesis of measuring means of information in-out on the microprocessors basis**
  Assoc. Prof . Yu.N. Evlanov, A.A. Shatochin
- **Signal processors and neural computers**
  Assoc.Prof. P.G.Krug
- **Measuring monitoring and diagnostics systems for high-voltage equipment**
  Sr. Teacher A.P. Bykov
- **Quality parameters measurements in DC and AC electric networks**
  Sr. Teacher P.K. Makarychev
- **Control and measuring systems for the heating systems**
  Assoc.Prof . N.A.Serov

Agreements, Contracts, Projects Supported by State Budget

- Application of the function restoration theory on discrete readout for improvement of the quality control and intellectual devices diagnostics
- Theoretical questions of the analysis, calculation and modeling of measuring units for data acquisition systems
- Measuring system of windings mechanical condition diagnostics in power transformers
- Measuring system for metals hardness measurement

Key publications

- *Zhelbakov I.N.* Education of MPEI students in engineering direction in English medium (i***n*** Russian) Proc. of Conf. «Actual problems of universities international co-operation in XX! Century», 23rd of May, 2003, MPEI Publisher, pp.6-8.
- *V.I.Didenko, A.L.Movchan, J.S.Solodov.* Modelling of instrumentation sigma-delta analog-to-digital converters. – Proceedings of the 8th International Workshop on ADS Modelling and Testing IWADS 2003. Perugia, Italy, September 8 – 10, p.p. 75 -80

- *V.I.Didenko, A.L.Movchan, J.S.Solodov.* Behavioural modelling of instrumentation delta- sigma ADS. – 13th International Symposium on Measurements. 2004, Achens, Greece, p.p. 793 – 798.
- *Evlanov Yu.N., Nikolaichuk O.D., Novikov V.A., Serov N.A., Shatokhin A.A., Stubenchikov V.M.* Two-wires overpressure sensor (in Russian). Proc. of Intern. Conf. «Informational means and technologies», 14-16 of Oct. 2003, vol.2, Yanus-K Publisher, 2003, pp.150-152.*Didenko V.I., Shakhov S.N.* Determination of cable path destruction place in power supply systems (in Russian). Proc. of Intern. Conf. «Informational means and technologies», 14-16 of Oct. 2003, vol.2, Yanus-K Publisher, 2003, pp.237-240.
- *Evlanov Yu.N., Novikov V.A., Shatokhin A.A.* Single-crystal microcontroller 80C522 (in Russian). Educational textbook for the course «Circuit technology and software for electronic measuring systems». MPEI Publisher, 2001.
- *Krug P.G.* Signal proccessors and neural computers (in Russian). MPEI Publisher, 2002.
- *Krug P.G.* Processors for digital signal processing (in Russian). Educational textbook for the course «Microprocessors». MPEI Publisher, 2001.

Partners

- «Rosuchpribor», Moscow
- Russian research radio engineering institute, Moscow
- The mining concentrating industrial complex «Erdenet», Mongolia
- Vyborg converters factory, Vyborg
- Elabyga electrical networks, Elabuga
- R&D Institute «Teplopribor», Moscow
- Nizhniy Novgorod Vtorchermet plant, N. Novgorod
- Prompriborservis, Moscow
- Company MIDAUS, Ulyanovsk

Unique equipment

- The software package for analog-digital transformation channels testing in dynamic mode
- The measuring complex of power transformers windings PFI 24-10P
- The measuring complexes for measurement of metals properties
- The software package of the neural networks «VOICE-2002» (№ 2000262042, 05.12.02, ROSPATENT, vested interest – MPEI (TU))
- The measuring monitoring system of transformers technical parameters «POLICOM RPN»

IACE DEPARTMENT OF ELECTRICAL PHYSICS

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The department has on its staff:
26 lecturers,
3 research workers,
5 Ph.D. students.

Head of Department:
Yuri A. KAZANTSEV
Cand. Sci. (Tech.), Prof.

Main Lines of Research

Research supervisors

- **Development of digital systems for quality and quantity monitoring of electrical energy in high-voltage power networks**
  Prof.Y.A. Kazantsev, Assoc. Prof. V.M. Gevorkyan
- **Development of design and calculation methods for low-sized passive and active UHF devices**
  Prof.Y.A. Kazantsev, Assoc. Prof. V.M. Gevorkyan
- **Electromagnetic compatibility of electrical and power technical equipment**
  Prof.Y.A. Kazantsev, Assoc. Prof. V.M. Gevorkyan
- **Research and development of algorithms for digital systems of information processing**
  Assoc. Prof. E.A. Borodkin
- **Digital technologies of data security**
  Assoc. Prof. A.A. Rytov
- **Analysis and synthesis methods for multidimensional digital filters and analog-digital systems.**
  Prof. V.G. Mironov
- **Synthesis methods for multidimensional multirate systems.**
  Assoc. Prof. M.K. Tchobanou

Agreements, Contracts, Projects Supported by State Budget

- Electromagnetic compatibility of the control, monitoring and data transmitting systems with the high-voltage equipment
- Miniature microwave devices for signals' generation based upon the ceramic materials with high dielectric permeability
- Development of the noise-immune autonomous device for measurement of quality and quantity of electric power on high-voltage transmitting line
- Application of multidimensional wavelet transform to image and three-dimensional signals' restoration
- Measurement problem of the electric power quality parameters
- Synthesis of effective two, three and four-dimensional multirate systems for processing of multidimensional signals

Key publications

- *Bunin A.V., Gevorkyan V.M., Kazantsev Y.A.* Complex measurement device for automatic accounting system of quality and quantity of electric power (in Russian) // Electro, 2003. №1, pp.18-22.
- *Bunin A.V., Gevorkyan V.M., Dobosin S.N.* Automatic accounting system of quality and quantity of electric power (in Russian). Patent №2224260 , 2004.

- *Vishnyakov S.V., Gevorkyan V.M., Kazantsev Y.A.* Computer-aided synthesis of the high-Q oscillating system of millimeter-wave oscillator (in Russian) // Electronics: Science, Technology, Business, 2004. №2, pp.52-56.
- *Bunin A.V., Gevorkyan V.M., Kazantsev Y.A.* High-voltage complex measurement device for automatic accounting system of quality and quantity of electric power (in Russian). Proc. of the 8th All-Russia conf. EMS-2004. Saint-Petersburg, 2004, pp. 421-426.
- *Tchobanou M. K.* Multidimensional multirate systems and multidimensional wavelet functions: Part I. Theory (in Russian) // Vestnik MEI, 2003. №2, pp. 75-82.
- *Tchobanou M. K.* Multidimensional multirate systems and multidimensional wavelet functions: Part II. Synthesis (in Russian) // Vestnik MEI, 2003. №3, pp. 69-78
- *Tchobanou M. K.* Design and implementation of multidimensional multirate systems. 47th Midwest Symposium on Circuits and Systems MWSCAS'2004, Hiroshima, 2004, II-541-544.
- *Tchobanou M.K., Bolshakova O.V.* Synthesis of Orthogonal and Biorthogonal Multidimensional Filter Banks. International TICSP Workshop on Spectral Methods and Multirate Signal Processing SMMSP'2004, Vienna, 2004, 15-20.
- *Mironov V.G.* Synthesis methods of two-dimensional discrete-analog systems for signal processing (in Russian) // Electrichestvo, 2003. №7
- *Mironov V.G.* The design fundamentals of discrete-analog systems for signal processing (in Russian) // Electrichestvo, 2003. №10.

Partners

- State science center «All-Russian electrotechnical institute», Moscow
- State unitary firm «Science-research institute of Avtomatica», Moscow
- Special Research Bureau MPEI, Moscow
- University Tsinghua, Beijing, People Republic of China
- The Norwegian university of science and technology, Trondheim, Norway
- State unitary firm «Science-research institute of precision devices», Moscow
- «Girikond» company, Saint-Petersburg
- State unitary firm «Research Bureau Luch», Rybinsk
- Company «Ceramica», Saint-Petersburg
- Tokyo Institute of Technology, Japan
- Tampere University of Technology, Finland.
- University of California at Santa Barbara, USA.

IACE DEPARTMENT OF APPLIED MATHEMATICS

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8 research workers,
and 20 Ph.D. students

Head of Department:
Alexander P. EREMEEV
Dr. Sci. (Tech.), Prof.

■ Main Lines of Research

Research supervisors

- **Fundamental problems of artificial intelligence**
  Prof. A.P. Eremeev, Prof. D.A. Pospelov, Prof. V.N. Vagin
- **Approaches, languages and systems of parallel programming. Mathematical base and software of modern computers, systems and networks**
  Prof. V.P. Kutepov, Prof. V.N. Falk,
  Assoc. Prof. M.P. Konoshenko, Assoc. Prof. O. Yu. Shamaeva
- **Mathematical methods and software for intelligent systems: control systems and decision support systems, expert systems, learning systems etc.**
  Prof. A.P. Eremeev, Prof. D.A. Pospelov, Prof. V.N. Vagin,
  Assoc. Prof. A.A. Bashlykov, Assoc. Prof. E.Yu. Golovina, Assoc. Prof. V.V. Troitsky
- **Mathematical methods and software for intelligent CAD systems, automated learning systems, information systems and networks, computer graphics**
  Prof. I.A. Bashmakov, Prof. V.B. Glagolev, Assoc. Prof. Kalitin S.S.,
  Assoc. Prof. I.V. Mukhlaeva, Assoc. Prof. Sherbin V.M., Assoc. Prof. Shevchenko A.G.
- **Models of local computer networks and mobile cellular information transfer networks**
  Prof. V.P. Klimanov
- **Non-classical logic and calculations models (possibilities logic, fuzzy sets, neural nets, etc.) for intelligent systems; multi-agent systems**
  Assoc. Prof. A.N. Averkin, Assoc. Prof. E.V. Denshikova, Assoc. Prof. V.B. Tarasov
- **Software for modern information system and nets; modern INTERNET/INTRANET technologies**
  Assoc. Prof. P.L. Chernov, Head of res. lab T.V. Luk'ianova
- **Software development and verification technology, informational resources protection**
  Assoc. Prof. P.B. Khorev, Assoc. Prof. M.M. Maran, Assoc. Prof. V.D. Pashintsev
- **Modern databases control systems and data processing tools, corporate information systems**
  Assoc. Prof. L.V. Churkina, Assoc. Prof. V.A. Fedin,
  Assoc. Prof. V.N. Krinitsky, Assoc. Prof. V.I. Lukanina
- **Analysis and application of graph models**
  Assoc. Prof. V.A. Kokhov
- **Modern control theory**
  Assoc. Prof. R.M. Akchurin

Agreements, Contracts, Projects Supported by State Budget

- Research and development of semiotic models of the knowledge representation and reliable and trustworthy conclusions approaches in intelligence systems for decision making
- Semiotic models development for decision making support on the base of non-traditional logic approach
- Software development for cluster systems
- Development of theoretical bases of information and network technologies in learning and decision making
- Development of theoretical bases of the computer environments and intellectual systems creation oriented to functional-logic style of applied problems solution
- Research and development of the combined approach and the technology for the corporate information systems creation and escort
- Network multi-language cadastre of the information resources for open education system of Russia
- Hardware means and mediums for design of multimedia computer simulators and learning systems

Key publications

- Vagin V.N., Golovina E.Yu., Zagrianskaya A.A., Fomina M.V. Exact and plausible reasoning in intelligent systems. Vagin V.N. and Pospelov D.A. (editors). Fizmatlit. 2004, (in Russian).
- B A.I., Bashmakov I.A. Development of computer-aided textbooks and learning systems. – FILIN Publisher. 2003. (in Russian).ahë12
- of object-oriented programming. ACADEMIA Publisher. 2004. (in Russian).
- Bashmakov A.I., Bashmakov I.A. Intellectual information technologies. MSTU Publisher, 2005. (in Russian).
- Bashmakov I.A., Rabinovitch P.D. On informatization conception of educational process. Vestnil MEI. 2003, no. 4, p. 105 (in Russian).
- Eremeev A.P., Vagin V.N. A real-time decision support system prototype for management of power block using cognitive graphics. Proceedings X-th International Conference Knowledge-Dialog-Solution (KDS 2003), June 16-26, 2003, Varna (Bulgaria), FOI-COMMERCE, Sofia, 2003, p. 79.
- Eremeev A.P., Vagin V.N.A real-time decision support system prototype for management of a power block. International Journal «Information Theories & Applications», 2003, Vol. 10, Number 3, p.248.
- Eremeev A.P., Troitsky V.V. Representation models of temporal relations in intelligent decision support systems. Journal of Computer and Systems Sciences International, Vol.42, No.5, 2003, p.732.
- Eremeev A.P., Nedelina A.Yu. Methods and algorithms of strategic planning for decision support systems. Proc. Of the Sixth Joint Conf. on Knowledge-Based Software Engineering. V. Stefanuk and K. Kaifiri (Eds.), IOS Press, 2004, p. 247.

Dissertations

- V.N. Falk. Directed relations theory and its applications. Dr. Sci. (Tech.) Dissertation. 2001.
- E.V. Dentshikova. Mathematical bases and software for imitative models of control processes in biological systems. Cand. Sci. (Tech.) Dissertation. 2003.

- V.V. Troitsky. Methods and software tools for temporal relation representation in intelligent decision support systems. Cand. Sci. (Tech.) Dissertation. 2004.

Partners

- Computer Center of Russian Academy of Sciences (RAS), Moscow
- Institute of program systems of RAS, Moscow
- Control problems Institute of RAS, Moscow
- Information analytical Center of distant education system, Moscow
- Cybernetics Institute, Ukraine
- Cybernetics Institute, Belarus
- Belarus State radio engineering university, Minsk
- National Technical university of Ukraine, Kiev
- Warsaw Technical University, Poland
- Bratislava Technical University, Slovakia
- Jensim Corp., USA
- Ilmenau Technical University, Germany
- Tolouse National university, France
- Universities of Manchester and Edinburg, UK

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35 lecturers,
1 research worker
and 12 Ph.D. students.

Head of Department:
Igor I. LADYGIN
Cand. Sci. (Tech.), Prof.

Main Lines of Research

Research supervisors

- **Research of modern principles for parallel data processing. Fault-tolerant computation systems development**
  Prof. I.I. Ladygin
- **Network computer technologies. Model development, productivity evaluation and network node parameters measurement, their representation**
  Prof. L.I. Abrosimov
- **Computer and network systems of knowledge diagnostics**
  Assoc. Prof . V.A. Afonin
- **The usage of modern applied software packages for modeling and designing of computer engineering means**
  Prof. V.N. Balashov
- **Algorithms and methods of halftone images compression. Discontinuous processes modeling in GPSS**
  Assoc. Prof . A.G. Goltsov
- **Designing and setting up of fault-tolerant networks**
  Assoc. Prof . G.G. Danilin
- **Multiple-processor computation systems modeling. Designing of microprocessor systems for object control**
  Assoc. Prof . A.A. Deryugin
- **Designing of systems based on modern micro-controllers**
  Assoc. Prof . A.V. Ivanov
- **Research in the field of new architectural principles of computation systems. Data integration and knowledge extraction. Education technologies development**
  Prof. I.I. Dzegelenok
- **Databases design**
  Assoc. Prof . V.G. Dolotov
- **Speech technologies and the education process automation**
  Assoc. Prof . A.I. Evseev
- **Designing of microprocessor control systems**
  Assoc. Prof . A.V. Kaporsky
- **Development of the Intranet-environment for the department**
  Assoc. Prof . A.F. Kryukov
- **Information security. Modern cryptography. Electronic digital signature. Electronic money. Steganography and stegoanalysis**
  Prof. Yu.N. Melnikov
- **Dataflow and conveyor computations models development. Computing systems architecture research, realizing dataflow and conveyor principles of data processing**
  Assoc. Prof . Yu.Y. Morokhovets

- **Administration of LINUX networks. Compact and build-in operation systems. WEB-systems with distributed databases**

  Assoc. Prof . A.A. Osadchiev
- **Automation of digital systems design and the simulation based on hardware description languages: VHDL and VERILOG**

  Assoc. Prof . A.K. Polyakov
- **Synergetics on the Department of computers, systems and networks**

  Assoc. Prof . N.N. Fadeev

Agreements, Contracts, Projects Supported by State Budget

- Research on the interaction processes of the microprocessor systems in distributed networks
- Development and study of the conveyor computations models
- Application of multi-conveyor systems simulation tools for production conveyor analysis
- Theoretical and experimental studies undertaking for creation of optimum information-computing enterprise network
- Analysis of the network features of the IMB network under study zone and preparing the report with recommendations
- Development and study of the exportable multitasking real-time kernel concept for specialized computer with the Harvard architecture

Key Publications

- Polyakov A.K. VHDL and Verilog Languages for Digital Equipment Design (in Russian). Solon-Press Publisher, 2003.
- Polyakov A.K. VHDL and Verilog Languages for Digital Systems Design. Part 1. – Simulation (in Russian). MPEI Publisher, 2003.
- Melnikov Yu.N. The Threats to safety of information (in Russian). Educational textbook for the course "Methods and means of information protection". MSSU Publisher, 2003.
- Ladygin I.I., Kryukov A.A., Kalinina G.A. Computers and Systems Architecture (in Russian). Laboratory practical works. MSTU «Stankin» Publisher, 2003.
- Ladygin I.I. Classification of computation system architectures (in Russian). // Proc.of the XIII Intern. seminar «Modern technologies in the problems of management, automations and data processing», 2004, Alushta. MPEI Publisher, 2004. P. 364–365.
- Kalinina G.A., Ladygin I.I., Morokhovetz Yu.Y. The Regular Conveyors. The concept and main characteristics (in Russian). // Proc. of the XIII Intern. seminar «Modern technologies in the problems of management, automations and data processing», 2004, Alushta. MPEI Publisher, 2004. P. 349-350.
- Dzegelionok I.I. Network educational technologies for knowledges actualization (in Russian). // "Information technologies in designing and production". FSUE "VIMI" Publisher, 2003, no. 3. Pp. 10–15.
- Melnikov Yu.N., Terenin A.A. Possibilities of hold up on bank information systems from Internet and some ways of the attacks repulse (in Russian). // Bankovskie tekhnologii. 2003, no. 1, P. 47–53, and no 2. P. 43–58.
- Melnikov Yu.N., Koloshein Yu. A. The hiding of bank information possibilities in text file (in Russian). // Bankovskie tekhnologii. 2003, no. 11. P. 35-37, and no 12. P. 39-42.
- Kalinina G.A., Ladygin I.I., Morokhovetz Yu.Y. Formal definition of the active program component concept (in Russian). // Proc. of the XIII Intern. seminar «Modern technologies in the problems of management, automations and data processing», 2004, Alushta. MSU Publisher, 2004. P. 190–192.

- Deryugin A.A. Memory coherency of the multiprocessor computation systems (in Russian). // Proc. of the Intern. Conf. «Informational means and technologies». Moscow. Yanus-K Publisher, 2004, vol. 3. P. 104–107
- Abrosimov L.I. Sultanov K.V. Maishan Sedaghati, Research of wide area network (WAN) performance (in Russian). // Proc. of the Intern. Conf. «Informational means and technologies». Moscow. Yanus-K Publisher, 2004, vol. 3. P. 80–83.

Dissertations

- Muratov I.N. Research and development of the method for provision structural interoperable information systems on the metamodels base. Cand. Sci. (Tech.) Dissertation, 2003.
- Chernov S.A. Research and implementation of the basing computer system with high level internal language. Cand. Sci. (Tech.) Dissertation, 2003.
- Otsokov S.A. Algorithmic and structural organization of super-computers by using the model of the faultless computations. Cand. Sci. (Tech.) Dissertation, 2004.
- Terenin A.A. Methods of the protected network creation for electronic payments. Cand. Sci. (Tech.) Dissertation, 2004.

Partners

- State unitary enterprise «All-Russian electro technical institute», Moscow
- RAS Data communication problems institute, Moscow
- RAS Institute of microprocessor systems, Moscow
- Scientific and technical center of Russian banks association, Moscow
- Design bureau of informatics, hydro-acoustics and communications, Moscow
- Research-and-production Company «Agrostroy», Moscow
- IT consulting company «Sterling Group», Moscow
- IBM Deutschland Scientific center, Heidelberg, Germany
- Technical University of Ilmenau, Germany
- Technical University of Dresden, Germany

IACE DEPARTMENT OF MATHEMATICAL MODELING

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Main Lines of Research

Research supervisors

- **Non-standard models of mathematical physics and methods of their investigations (nonlinear analytic problems of variation type, Clifford analysis, viscous compressible media dynamics equations etc,)**
  Prof. A.A. Amosov, Prof. Ju.A. Dubinskiy, Prof A. A. Zlotnik, Prof. Tsl.V. Kislov
- **Numerical methods for solving of some mathematical physics problems and quasi-linear equations systems for dynamics of the viscous compressible media with uneven data**
  Prof. A.A. Amosov, Prof. Ya.M. Zhileikin, Prof. A.A. Zlotnik
- **Mathematical modeling of discrete systems: implementation of large algebraic structures with applications to computer algebra, coding theory, cryptography, decision making and diagnostics**
  Prof. A.B. Frolov, Assoc. Prof. D.G. Meschaninov
- **Mathematical and information providing of economic activity**
  Prof. A.B. Frolov, Assoc. Prof . A.A. Akhmetshin, Assoc. Prof. A.A. Zaslavskii
- **Statistical methods of digital information processing, optimization methods**
  Prof. Ju.A. Goritskii, Assoc, Prof. A.Z. Ishmuhametov
- **Intellectual recognition systems, date bases**
  Prof. A.V. Knjazev, Assoc. Prof. V.S. Zubov
- **Oriented hypersurfaces in spaces with internal metric, fuzzy structures**
  Prof. V.K. Ionin.

Agreements, Contracts. Projects Supported by State Budget

- Non-classical nonlinear boundary-value problems and methods of its investigation
- Boundary problems for equations in partial derivatives in the frame of Clifford analysis
- Development of methods for solving of some mathematical physics problems
- Systems of equations for viscous compressible flows and for heat exchange by radiation
- Numerical methods for solving mathematical physics and viscous compressible media dynamics problems with non-smooth data
- Systems of quasi-linear equations of a viscous compressible media dynamics and their two-scale homogenization.
- Analysis and implementation and verification principles development for intellectual systems of functional type
- Support systems for financial promotion of research activities

Key publications

- Amosov A.A., Larina T.A.. On solvability of one nonstationary problem of radiation heat transfer in a system of absolutely black bodies (in Russian) // Vestnik MEI. 2003. N 6. P. 5-18.

- *Amosov A., Panasenko G., Rutily B.* An approximate solution to the integral radiative transfer equation in an optically thick slab // C. R. Acad. Sci. Ser. II b. 2003. V.331. N 12. P. 823-828.
- Amosov A.A. Global solvability of one nonlinear evolutionary problem with a non-local boundary value condition of radiative heat exchange type (in Russian) // Differential Equations. 2004. V.40. N 12. P. 1-12
- Mario Ahues, Andrei Amosov, Alain Largillier, Olivier Titaud.L^p error estimates for projection approximations // Applied Mathematics Letters, 2004 (
- *Vestfalsky A.E.* Difference scheme for the quasi-averaged equations of one-dimensional motion of viscous compressible media (in Russian) // Vestnik MEI. 2003. N 6. P. 30-42.
- *Straskraba, A. Zlotnik.* Global properties of solutions to 1-d viscous compressible barotropic fluid equations with density dependent viscosity // Z. Angew. Math. Mech. 2003. V. 54. P. 593-607.
- *Zlotnik A.A.,Song Jiang.* Correctness of the Caushy problem for the equations of a 1D viscous heat-conducting gas with the Lebesgue initial data (in Russian) // Math. Notes 2003. V. 75. N 5. P.730-735.
- *Zlotnik A.A.* Global behavior of 1-D viscous compressible barotropic flows with free boundary and self-gravitation // Math. Meth. Appl. Sci. 2003. V. 26. P. 671-690.
- *Zlotnik A.A.* Stress and heat flux stabilization for viscous compressible medium equations with a non-monotone equation of state // Appl. Math. Letters. 2003. V. 16. N 8. P. 1231- 1237.
- *Bernard Ducomet, Alexander Zlotnik.* Stabilization for equations of one-dimensional viscous compressible heat-conducting media with non-monotone equation of state. // Journal of Differential Equations. 2003. V. 194. N 1. P. 51-81.
- *Bernard Ducomet, Alexander Zlotnik.* Stabilization for 1D radiative and reactive viscous gas flows // Comptes Rendus de l'Academie des Sciences. Paris. Serie I. 2004. V. 338. P. 127-132.
- *A.A. Zlotnik*. Weak solutions of the motion equations of viscous compressible reacting binary mixtures: uniqueness and Lipshitz-continuous dependence on data (in Russian) // Math. Notes. 2004. V. 75. P. 278-283.
- *V.V. Gileva, A.A. Zlotnik*. On a variable-weight difference scheme for the equations of one-dimensional flow od a viscous compressible barotropic fluid. Comp. Math. Math. Phys. 2004. V. 44. P. 1024-1037.
- *A.A. Zlotnik, B. Ducomet*. Global behavior of viscous compressible barotropic symmetric flows with a free surface for a general body force. Dokl. Math. 2004. V. 70. P. 730-734.
- *Dubinskii J.A.* Complex analog of Neuman problem and orthogonal decomposition of Lebesque space (in Russian)// RAS Doklady, V. 393, N2, 2003, 4p
- *Dubinskii J.A.* Complex analog of Pouncare inequality (in Russian) // Vestnik MEI, N6, 2003, 10p
- *Dubinskii J.A.* Complex Neuman problem and decomposition of Lebesque space (in Russian) // Discrete and continuos dynamical systems, V10, N 1,2, 2004/
- *Dubinskii J.A.* On some complex boundary problem (in Russian) // Vestnik MEI, N6, 2004.
- *Krupin G.V.* Orthogonal decomposition of Lebesque space and corresponding boundary value problems (in Russian) // Vesnik MEI, N6, 2004.
- *Krasnogorskii A.M.* Generalized Green functions for some complex problems with nontrivial kernel (in Russian) // Vestnik MEI, N6, 2004.Zubkov P.V. A problem of function extension beyond a disk in weight spaces (in Russian) // Vestnik MEI, N6, 2003, pp. 62-66.

- Pereskokov A.V Asymptotic solutions to a problem for cos- and sin amplitudes of the Airy polaron (in Russian) // Vestnik MEI, N6, 2003, C67-84.
- Karasev M.V. Pereskokov A.V. Global asymptotic and quantization rules for nonlinear differential equations / Asymptotic Methods for Wave and Quantum Problems (M.V. Karasev, ed.) // Amer. Math. Soc., Providence, RI. 2003, Vol.208. P.165-234
- Shevchenko I.V. Zubov V.S. Influence of the locality on labor intensity of processing large data arrays (in Russian) // Vestnik MEI, N6, 2003, p. 106-116.
- Zaslavskii A.A. Algorithm of a nodal vectors method for integer programming problems (in Russian) // Vestnik MEI, N6, 2003, pp. 50-61.
- *Ionin V.K.* Closed Geodesics and Isopiremetrical Inequalities in Completed Space With Polihedral Metric of Non-Positive Curvature // Trudi po geometrii I analizu. Izdatelstvo Instituta Matematiki. Novosibirsk, 2003, pp. 154-157
- *Ionin V.K.* Vector and Affine Spaces // Trudi po geometrii I analizu. Izdatelstvo Instituta Matematiki. Novosibirsk, 2003, pp. 289-303
- *Goritskiy J.A., Meschaninov D.*G. Probability Theory Introduction (in Russian) // MPEI Publisher, 2004.
- *Goritskiy J.A.* Multidimentional random variables, limit theorems and elements of mathematical statistics (in Russian) // MPEI Publisher, 2004.
- *Gorelov V.*A. On the Siegel conjecture for second-order homogenous linear differential equations (in Russian) // Mathematical notes V.75 N4, 2004, pp. 549-565

Dissertations

- *Vestfalsky A.E.*. Finite-difference methods for equations of one-dimensional movement of viscous heat-conducting media. *Cand.Sci. (Phys.Math.) Dissertation*, 2004.
- *Opolchionov A.V.* Methods and software for creation of functional type decision procedure systems. *Cand.Sci. (Phys.Math.) Dissertation*, 2004.

Partners

- Moscow State Lomonosov University
- Computational center of Russian Academy of Sciences, Moscow, Russia
- Institute of hydrodynamics (Siberian Branch of Russian Academy of Sciences), Novosibirsk, Russia
- Institute of Computational Mathematics (Russian Academy of Sciences), Moscow, Russia
- Institute of Mathematical Modeling (Russian Academy of Sciences), Moscow, Russia
- Sobolev Mathematical Institute (Siberian Branch of Russian Academy of Sciences), Novosibirsk. Russia
- Kazan State University, Kazan, Russia
- Rostov State University, Rostov-on-Don, Russia
- Bergakademie Freiberg, Germany
- Mathematical Institute of Berlin Freie Universitat, Germany
- Institute of mathematics (Czech Academy of Sciences), Prague
- Universite Jean Monnet, Saint-Etienne, France

IACE DEPARTMENT OF ELECTRICAL ENGINEERING AND INTROSCOPY

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20 lecturers,
3 research workers,
and 6 Ph.D. students

Head of Department:
Valery P. LUNIN
Cand. Sci. (Tech.) Assoc. Prof.

Main Lines of Research

Research supervisors

- **Electromagnetic phenomena numeric modeling and algorithms for inverse problem solution of non-destructive evaluation tasks.**
  Assoc. Prof. V.P. Lunin
- **Practical techniques for eddy current and magnetic non-destructive testing**
  Prof. A.D. Pokrovsky
- **Eddy current based approaches for defect parameters evaluation**
  Assoc. Prof. L.A. Chernov
- **Non-destructive testing devices and its usage in industry**
  Prof. V.V. Sukhorukov

Agreements, Contracts, Projects Supported by State Budget

- Research and development of effective algorithms for diagnostic information processing in in-tube magnetic defectoscopes
- Development of algorithms and the software creation for detection, classification, and estimation of defects parameters in heat-exchange tubes in nuclear power plant boiler on the base of the vortex-current testing results
- Theoretical and experimental bases development for designing devices of vortex-current and magnetic testing for quality of products made from metals and alloys
- Analysis methods development for diagnostic images and recognition on the base of neural technologies
- Matrix transducer design for vortex-current and magnetic non-destructive testing
- Development and implementation of magnetic defectoscopes for steel ropes testing and vortex-current devices for metalization thickness testing in printed cards

Key Publications

- V.Lunin, A.Zhdanov «Two-step Algorithm in Calculation of Defect Influenced Eddy Current Field», Proc. of the 48th International Scientific Colloquium. Ilmenau, Germany, 2003, pp.345-346
- V.Barat, V.Lunin, H.-U.Seidel, A.Bock «Signal Processing of Magnetic flux Leakage Data Obtained from Pipeline Inspection», Ibid. pp.131-132
- D.Alexeevsky, V.Lunin, H.Brauer «Application of Genetic Algorithm for Seaching Interface Reconstruction Solution in Representative Database of Signals from Interface Shapes», Ibid. pp.415-416
- D.Alexeevsky, V.Lunin, H.Brauer «Application of Finite Element Method for Modeling of the Two-Component Cylinder with Complicated Interface Shape», Ibid.pp.417-418

- V.Lunin, D.Alexeevsky: «Numerical Prediction of Signal for Magnetic Flux Leakage Benchmark Task», *Review of Progress in QNDE*, vol.22, eds. D.O.Thompson and D.E.Chimenti (American Institute of Physics, NY, 2003), pp.1830-1837
- Fedosenko U.K., Gerassimov V.G., Pokrovskiy A.D., Ostanin Yu.Ya. Non-destructive Testing: Reference Book (in Russian): Edited by. V.V. Klujev: Vol 2 Eddy Current – Mashinostrojenije Publisher, 2003.

Partners

- Moscow State Bauman Technical University (MSTU)
- Moscow scientific production association "Spektr"
- VEECO Instruments, USA
- "TransNeft"
- NIKIMT, Obninsk engineering center
- VNIIAES
- NIKIMT
- VIAM
- Gosgortechnadzor of Russia
- Federal institute of investigation and control of materials (BAM), Berlin, Germany
- Ilmenau Technical University, Germany
- Iowa State University, USA
- Fraunhofer non-destructive material investigations institute, Saarbruken, Germany
- Konstanz high technical school, Germany

Unique Equipment

- The metallization layer thickness measurement device for electronic plates
- Defectoscope for steel wire rope testing
- Eddy current defectoscopes for crack detection in components under load
- Magnetic testing conditions indicator
- Package of training programs in the field of electrical engineering, magnetic circuits, electromagnetic field analysis, non-destructive testing

INSTITUTE OF RADIO ENGINEERING AND ELECTRONICS (IREE)

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- **Radio Engineering Faculty**
- **Faculty of Electronics**

Dean of the Faculty of Electronics

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Departments of the Faculty:

- **Department of Physics named after V.A. Fabrikant**
- **Department of Electronic Devices.....**
- **Department of Lighting Engineering .....**
- **Department of Industrial Electronics .....**
- **Department of Semiconductor Electronics.....**

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Departments of the Faculty:

- **Department of Generation of Oscillations and Signals.....**
- **Department of Fundamentals of Radio Engineering**
- **Department of Radio Receivers .....**
- **Department of Radio Engineering Systems .....**
- **Department of Antennas and Radio Waves Propagation .....**
- **Department of Radio Technical Devices.....**
- **Research Department of Gyromagnetic Radio Electronics .....**
- **Academic-Research Center of Modern Radio Electronic and Telecommunication Technologies ....**

IREE DEPARTMENT OF PHYSICS NAMED AFTER V.A. FABRIKANT

FE

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The department has on its staff
54 lecturers,
5 research workers,
and 5 Ph.D. students

Head of Department:
Olga A. Evtikhieva
Cand. Sci. (Tech.), Professor

Main Lines of Research

Research supervisors

- **Laser gradient refractometry**
  Prof. O.A. Evtikhieva
- **Laser diagnostics of flows: applications in power engineering and thermal physics experiments**
  Prof. B.S. Rinkevichus
- **Applied laser optics**
  Prof. E.F. Ischenko
- **Statistical optics and laser turbulence diagnostic**
  Prof. V.I. Smirnov
- **Examination of inelastic collisions of electrons with atoms and molecules**
  Sr. Researcher Yu.M. Smirnov
- **Plasma polarization analysis**
  Assoc. Prof. M.V. Shapochkin

Agreements, Contracts, Projects Supported by State Budget

- Development of laser-computer method of particle velocity field measurements in fluid and gas flows
- Computer modeling of laser Doppler vibrometer operation with digital signal processing
- Development of computer-laser refractive methods for non-stationary, inhomogeneity heat processes in fluid and gas flows in energy-physical setups
- Development of multifunctional portable laser refractometer system for technological processes control and ecological problem solving
- Computer technologies of determination of gas bubbles size and velocity in liquid mediums
- New optical scheme of laser anemometer by particle images for hydrodinamics investigations
- The investigations of phase peculiarities of laser beam scattering by large moving particles

Key Publications

- Optical methods of flow investigation (in Russian). Proc. of the VI Intern. Conf. /Under edition of Yu.N. Dubnischev, B.S. Rinkevichius, MPEI Publisher. 2003.
- Yu.Dubnischev, B.Rinkevichius, N.Fomin. Novel PIV Systems for Fluid Mechanical Measurements. JEPTER, 2003, V. 76, N 6, p. 3 – 12. (In Russian)

- Yevtikhieva O.A., Imshenetskiy A.I., Rinkevichius B.S., Tolkachev A.V. Computer laser refraction method of optical inhomogeneity flows investigation. (in Russian). Izmeritelnaya Tekhnika, 2004. N 6, p. 36-42.
- Grechikhin V.A., Raskovskaya I.L., Rinkevichius B.S., Tolkachev A.V. Interference of laser beam by acustooptical effect (in Russian). Quantovaya elektronika, 2003. N 6. p. 742 – 747.
- Raskovskaya I.L., Rinkevichius B.S., Skornyakova N.M., Tolkachev A.V. The diffracted method of simultaneous measurement of large cylindrical particle radius and velocity (in Russian) // Izmeritelnaya Tekhnika, 2004. N 9, p. 26-31.
- Savchenko E.V., Razumov L.A., Rinkevichius B.S. The determination of Gaussian beam center coordinates with help of matrix photo-receiver by weighing method (in Russian) / / Izmeritelnaya Tekhnika, 2003. N 10, p. 48-50.
- Skornyakova N. M., Popova E. M., Rinkevichius B. S. and Tolkachev A. V. Correlation processing of BOS pictures. // CD proc. of the 5 international symposium on Particle Image Velocimetry. Paper 3209. Pusan, Korea, 2003, 11 pp.
- Skornyakova N.M., Popova E. M., Rinkevichyus B.S., Tolkachev A.V. The investigation of heat transfer by Background Oriented Shlieren Method. //CD-ROM Proc. of the 12th International Symposium on Application of Laser Techniques to Fluid Mechanics. Lisbon: 2004.
- Smirnov Yu.M. Excitation of odd levels of YbII by collisions of electrons with ytterbium atoms (in Russian). // Teplophisika vysokikh temperatur, 2004. T. 42. N 2. P. 214–220.
- Smirnov Yu.M. Excitation cross-sections for PtI transitions terminating on levels of the low-lying 3F term (in Russian). // Optika i spektroskopiya, 2004. T. 96. N 3. P. 363–368.
- Smirnov Yu.M. Generation of excited lead ions by collisions of slow electrons with PbI2 molecules (in Russian). // Khimicheskaya fisika. 2004. T. 23. N 5. P. 29–33.
- Smirnov Yu.M. Excitation cross-sections for 1S- and 1P0 levels of strontium atom in e–Sr collisions (in Russian). // Optika i spektroscopiya, 2004. T. 97. N 5. P. 723–728.
- Kuznetsova T.I., Zubov V.A. Measurements of Optical Signals and Their Spectra in the Femtosecond Range with Additional Phase Modulation. // Journal of Russian Laser Research. 2004. V. 25. N 3. P. 193 – 211.
- Merkin A.A., Zubov V.A. Measurements of Time-Varying Characteristics of Optical Signals and Inhomogeneities of Tested Substances with Additional Phase Modulation // Journal of Russian Laser Research. 2004. V. 25. N 4. P. 315 – 330.
- Mironova T.V., Sultanov T.T., Zubov V.A. Digital Photography in Measurements of Shifts of Object Surfaces with Formation of the Speckle Structure in White Light // Journal of Russian Laser Research. 2004. V. 25. N 6. P. 493 – 508.
- Rautian S.G., Zubov V.A. Measurement of the Characteristics of Optical Signals Varying in Time Based on Registration of the Doubled Spectrum with Geometrical Displacement in Spectral Plane // Journal of Russian Laser Research. 2004. V. 25. N 6. P. 509 – 521.

Dissertations

- Sokolov A.L. Polarization-wave analysis and characteristic optimization of optical devices with inhomogeneity polarization elements. Dr. Sci. (Techn.) Dissertation, 2003.

Partners

- Institute of mechanics problems of Russian Academy of Sciences, Moscow
- Institute of general physics of Russian Academy of Sciences, Moscow
- Institute of Thermal Physics, Novosibirsk

- Institute of Heat and Mass transfer, Minsk, Belarus
- Joined Institute of high temperature of Russian Academy of Sciences, Moscow
- Physical Institute named after P.N. Lebedev, Moscow
- Moscow State Lomonosov University
- Moscow State Bauman Technical University
- St-Peterburg State Technical University
- Moscow State Aviation University
- Edingbough University, UK
- Italian Space Agency, Italy
- German Space Institute, Goethengen, Germany
- Central R&D institute of machines, Moscow
- Central Institute of Aviation Motors, Moscow
- George Mason University, USA

Unique equipment

- Laser rig for diagnostics of sound fields
- Laser automated installation for diagnostics of turbulence
- Installation for examination of inelastic collisions of electrons with atoms and molecules
- Installation for deriving and analysis of polarized electron beams with an electron source of gas dynamic type
- Installation for examination of a polarization degree of atoms and ions spectral lines luminescence excited in vacuum by electron beam
- Fiber-optical sensors for examination of air-dynamic flows
- Laser computer refraction system for analysis of unsteady thermal processes

IREE

FE

DEPARTMENT OF ELECTRONIC DEVICES

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The department has on its staff
16 lecturers,
4 research worker,
and 5 Ph.D. students

Head of Department:
Vladimir N. Bodrov
Cand.Sci. (Tech.), Assoc. Prof.

■ Directions of scientific researches

Research supervisors

- **Development and research of vacuum and solid-state microwave devices and sets.**

  Prof. I.V. Lebedev.

- **Development of new methods and technical means of non-destructive ultrasonic testing and diagnostics of complex structural constructional materials and products.**

  Prof. V.K. Kachanov.

- **Development and research of non-traditional methods of composite materials and products testing on the basis of thermal acoustical effect usage.**

  Prof. V.K. Kachanov.

- **Fluctuations phenomena in electronic devices; diagnostics and evaluation of reliability of electronic elements and units.**

  Prof. M.D. Vorobiov.

- **Development, creation and application of thermal vision devices.**

  Assoc. Prof. V.N. Bodrov.

- **Thermovision.**

  Assoc. Prof. V.N. Bodrov.

- **Polychromatic pyrometry.**

  Assoc. Prof. V.N. Bodrov.

- **Processing of optical images.**

  Assoc. Prof. G.I.Obidin

■ Agreements, contracts, projects supported by State budget

- Development of universal multifunctional system of the ultrasonic testing and diagnostics of constructive elements and units of the nuclear power installations equipment.
- Research of non-traditional method of quality surveillance of composite units and products on the basis of thermal acoustical effect usage.
- Development of a hardware-software complex for the ultrasonic testing on the basis of the dynamic coordinated filters for split – signal.
- Development and research of piezo-converters with the given characteristics for operation in system «signal – converter – signal processor».
- Realization of complex researches on development and perfection of monitoring and diagnostics systems of design elements and equipment of nuclear power installations.
- Scientific bases development of gauges systems intellectualization with use of special signals and methods of their processing for research and control of environments, processes and objects.

Key publications

- I.V. Lebedev, D.V. Chuprov, Dispersive characteristics of wave guided slot-hole lines (in Russian) // Radiotekhnika. 2002. No.2. pp. 86-92.
- M.D. Vorobiov, Operation opportunities of numerical dynamic model of electron beam devices // Radio electronics and computer science. 2002. No.1. pp. 16-18.
- I.V. Lebedev, Radio-frequency "anomalies" of passive solid-state structures (in Russian) // Radiotekhnika. 2002. No.8. pp. 7-20.
- Achievements of Russian scientists in the field of microwave electronics (in Russian) // Special issue, Radiotekhnika, Under edition of I.V. Lebedev, No.2. No. 5. 2003.
- M.D. Vorobiov, A.E. Kolganov, A.N. Ugnivenko, Computer educational technologies on vacuum electronics (in Russian). Otkrytoe obrazovanie. No.4. 2003. pp. 25 – 29.
- Glumova M.V., M.D. Vorobiov, V.V. Starostenko, The Development and Investigation of a Numerical Dynamic Model of Vacuum-Tube Devices. Telecommunication and Radio Engineering. No.56 (1-2). 2003. pp. 126 – 133.
- V.K. Kachanov and others, Adaptive equipment and adaptive methods of the ultrasonic control (in Russian) // Proc. of the 5th International conference on Electromecanics, electrotechnologies and electromateriology. (22-27 September 2003, Krim, Alusta, Ukraine). The collection of reports. Volume 1, 2003. pp. 141-144.
- G.I.Obidin, A.L. Silvestrov, Mathematical modeling of an operation cycle of pyroelectronic vidicon (in Russian), Proc. of the 11-th All-Russia scient.conf. «Modern TV», Moscow, 2003.
- V.N. Bodrov, G.I.Obidin, Television method of fast temperature measurement (in Russian) . Ibid, pp. 59-62.
- V.N. Bodrov, P.S. Kondratov, «The real time videoprocessor for pyro-thermovisior» (in Russian). Ibid, pp. 56-59.
- I.V. Lebedev, Achievements of Russian scientists in the field of microwave electronics. Release 6 (in Russian) // Radiotekhnika. 2004. No.2.
- I.V. Lebedev, D.V. Chuprov, I.N. Miroshnikova, Low-frequency noise and impedance spectral characteristics of solid-state structures (in Russian) // Reports of the Academy of sciences, 2004. Volume 399. No.2.
- I.V. Lebedev, I.N. Miroshnikova, A.A. Svirin, D.V. Chuprov, Comparison impedance and noise spectra of semi-conductor diode structures (in Russian) // «Noise and degradation processes in semi-conductor devices». Proc. of the Intern. scient. seminar. MPEI Publisher, 2004, pp. 18-27.
- V.N. Bodrov, P.S. Kondratov, G.A. Padalko, The real time videoprocessor for pyro-thermovisior and low lavel television systems (in Russian)/ Proc. of the 18-th Intern. scient. conf. on photoelectronics and the night vision devices, Moscow, 2004, pp. 215-216.

Patents

- The patent of the Russian Federation No. 2204829. The device of the ultrasonic control / V.K. Kachanov and others // B.I. No.14, 2003.
- The patent of the Russian Federation No. 2213942 RU, МПК7 G01J5/60. The device of contactless measurement of temperature/ V.N. Bodrov, B.S. Melnikov, G.I.Obidin // B.I. No.28, 2003.

Partners

- National Polytechnical institute of Toulouse, France.
- The federal center of double technologies «Union», Dzerzhinsk, Moscow region.

- «All-Russia Scientific and Research institute of atomic power stations», Moscow.
- «Central R&D institute of special mechanical engineering», Khot'kovo, Moscow region.
- R&D institute «Istok», Friazino, Moscow region.
- «Scientific & Industrial Association «Videoscan», Moscow.

Unique equipment

- Universal computer system for electron devices reliability evalution by low frequency noise measurements.
- Installation for metrological certification of high-sensitivity (low level) receivers of optical radiation.
- Universal installation for test and certification of electron beam devices of the color image.
- Installation for characteristics measurements and metrological certification of piezoelectric converters.
- Installation for measurement of the physical-mechanical characteristics of concrete.

IREE
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DEPARTMENT OF LIGHTING ENGINEERING

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The department has on its staff
21 lecturers,
and 10 Ph.D. students

Head of Department:
Andrey A. GRYGORYEV
Dr. Sci. (Tech.), Assoc. Prof.

Main Lines of Research

Research supervisors

- **Development and creation of new high-efficiency gas-discharge visible and UV light sources**
  Prof. A.E. Ataev
- **Mathematical simulation methods of radiation transfer processes in scattering and absorbing media**
  Prof. V.P. Boudak
- **Realistic image synthesis of the three-dimensional scene illumination on the screen of computer monitor**
  Prof. V.P. Boudak
- **Optimization of optoelectronic image visualization systems parameters based on the statistical model of the visual organ**
  Assoc. Prof. A.A. Grigoriev
- **Electro-optical devices for medicine**
  Prof. A.I. Larushin
- **Development of quality assessment methods of lighting and color image reproduction**
  Assoc. Prof. S.M. Lebedkova, assoc. -prof. V.Yu. Snetkov
- **Architectural lighting, light-technical design and ecology of visual perception**
  Prof. A.V. Matveev
- **Investigation of spectral characteristics influence of radiation receivers and sources on photometric measurement errors**
  Assoc. Prof. V.M. Petrov
- **Mathematical methods of physical processes simulation in gas-discharge light sources and experimental investigation of processes in plasma**
  Prof. S.P. Reshenov, Assoc. Prof. N.P. Eliseev
- **Development of high-quality visible and IR light-optical systems**
  Assoc.-prof. V.I. Rychkov, Assoc. Prof. T.I. Yakushenkova

Agreements, Contracts, Projects Supported by State Budget

- Theoretical foundations and creation principles of high-precision combined system for short-range navigation in radio and optical ranges
- Development of new calculations methods of lighting and optoelectronic systems
- Development of the theory of the noisy images sensing by the observer
- Development of intelligent lighting control systems functioning algorithms
- Mathematical model development of polarized radiation reflection from natural formations

Key publications

- Agafonov V.V., Safronov A.G. Controllable objective with deformable mirrors (in Russian) // Quantum Electronics, 2004. V.34, N3. P.272-276.
- Boudak V.P., Kozelsky A.V. Backscattering radiance calculation in turbid medium with anisotropic scattering by spherical harmonics method //Proc. of the SPIE, 2003. V.5026. – P.135-139.
- Boudak V.P., Kozelsky A.V., Savitsky E.N. Mathematical model of solar radiation reflection by underlying surface //Proc. of the SPIE, 2003. V.5396. – P.344-349.
- Boudak V.P., Petrovichev A.V. Realistic image synthesis and image compression based on uniform chromaticity scale model //Proc. of the XII Nat. conf. «Light'2004». – Gabrovo: Vasil Aprilov, 2004. – P.245-249.
- Boudak V.P. About the photometer theory of a diffuse light field (in Russian) // Svetotekhnika, 2003. №5. – P.12-17. Boudak V.P., Kozelsky A.V. About precision and application range of the small angle approximation in the theory of radiative transfer (in Russian) //Atmospheric and ocean optics, 2004. V.17, №12. – P.968-974.
- Boudak V.P., Kozelsky A.V., Savitsky E.N. Improvement of the spherical harmonics method convergence at strongly anisotropic scattering (in Russian) //Atmospheric and ocean optics, 2004. V.17, №1. – P.28-33.
- Boudak V.P., Smirnov P.A. The comparative analysis of methods of global irradiating: Cohen hemicube method and Gershun hemisphere method (in Russian) //Proc. of the V Int. Light. conf. «Light and progress». Sankt-Peterburg, 2003. – P.221.
- Builin B.A., Lariushin A.I., Nikitina M.V. Laser phototherapy (in Russian) // FSUE «NII Polus» Publisher, 2004.
- Vas'kovsky A.A. Spectral efficiency of the low-sized objects sensing (in Russian) // Svetotekhnika. 2003, № 5. P.10-11.
- Grigoryev A.A., Desiatov A.A. Quasioptimal filtration algorithm for noised images processing based on statistical solutions theory //Proc. of the 7 Int. conf. «Pattern recognition and image analysis: New technologies». Vol.1. – SPbETU Publisher, 2004. – P.228-230.
- Grigoryev A.A., Zuev A.V. Statistical model of the color noisy images detection (in Russian) //Proc. of the V Int. Light. conf. «Light and progress». Sankt-Peterburg, 2003. – P.202-203.
- Grigoryev A.A., Martynov V.N., Potapova M.V., Yakushenkova T.I. New principles of the development and design of the optical systems of the panoramic surveillance electro-optical devices (in Russian) //Optical industry. Proc. of the Int. Sci.-tech. conf. «225 year of MIGACE». MIGACE Publisher, 2004. – P.20-24.
- Grigoryev A.A., Yakushenkova T.I., Potapova M.V. A construction of unicomponent optical blocks (in Russian) // Proc. of the High schools. Priborostroenie, 2004. T.47, №8. – P.49-53.
- Grigoryev A.A., Yakushenkova T.I., Potapova M.V. Receiving optical system of a panoramic electro-optical devices (versions) (in Russian) //Certificate of Russian Federation on useful model №34260. Bul. № 33 on 27.11.03.
- Gutsait E.M. Excitation conditions of the light-emitting discharge in electrodeless lamps at the various forms of an oscillations in cylindrical resonators (in Russian) // Svetotekhnika, 2003. № 2. – P.17-20.
- Gutsait E.M., Sidorov A.M. Illumination distribution at the use of LED modules (in Russian) //Proc. of the Int. Sci.-techn. conf. «Actual problems of electronic industry». Saratov, 2004. P.310-315.
- Lebedkova S.M., Mizyaeva I.N. Architectural – artistic illumination of children's musical school (in Russian) //Svetotekhnika, 2003. №5. – P.23-25.

- Matveev A.B. The metric of the light-color environment (in Russian) //Svetotekhnika, 2003. №3. – P.38-41.
- Matveev A.B., Kamenskaya G.V., Lebedkova S.M. An aesthetics of the light-color environment (in Russian) //Proc. of the V Int. Light. conf. «Light and progress». Sankt-Peterburg, 2003.- P.218-219.
- Reshenov S.P. About the atom levels population of quicksilver in the high-pressure discharge (in Russian) //Svetotekhnika, 2003, №2. – P.35-39.
- Reshenov S.P. A microwave high-pressure discharge in the quicksilver vapor (in Russian) // Svetotekhnika, 2003. №5. – P.4-9. (in Russian)

Dissertations

- Moskvin S.V. Design principles and hardware implementation of the electro-optical devices on the basis of pulsing lasers for medicine. Cand. Sci. (Tech) Dissertation, 2003.

Partners

- «Lisma» SC, Saransk, Mordovia
- «Elektroluch» SC, Moscow
- «Moscow electric lamp plant» SC, Moscow
- Bratislava Polytechnical institute, Slovakia
- Shanghai Polytechnical institute, China
- Beijing Polytechnical institute, China
- Special design bureau of night-vision equipment of «Orion» SPA, Moscow
- All-Russian research lighting engineering institute, Moscow
- Ilmenau Technical university, Germany
- Karlsruhe University, Germany

Unique equipment

- System for automated investigation of spectral characteristics of light sources and reflective materials
- The data acquisition device on the basis of National Instruments card PCI-6024E with the NI software LabVIEW 7.1

IREE
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DEPARTMENT OF INDUSTRIAL ELECTRONICS

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The department has on its staff
23 lecturers,
and 12 Ph.D. students

Head of Department:
Dmitri I. PANFILOV
Dr. Sci. (Tech.), Prof.

■ Main Lines of Research

Research supervisors

- **Design and investigation of power supply for gas discharge high efficient light sources**
  Prof. D.I. Panfilov, Assoc. Prof. V.D. Polyakov
- **Microprocessor systems for lighting control**
  Prof. D.I. Panfilov, Assoc. Prof. V.D. Polyakov
- **Power electronic devices for technology purposes**
  Assoc. Prof. G.N. Gorbachev
- **Design and investigation of intellectual power modules and power converters on their bases including modules with special characteristics**
  Assoc. Prof. A.I. Tsarenko
- **Control of power electronic units**
  Prof. S.G. Obuhov
- **Design and investigation of power semiconductors switches based on new combined technologies**
  Assoc. Prof. P.A. Voronin
- **Design and investigation of power sources for electronic units of general application**
  Assoc. Prof. V.U. Golikov, Assoc. Prof. I.G. Nedoluzhko
- **Design and investigation of automobile electronics items**
  Prof. D.I. Panfilov

■ Agreements, Contracts, Projects Supported by State Budget

- Resonant thyristor inverters in power sources for induction heaters and ozone generators
- Design of experimental equipment for investigation of Infineon power supply sources
- Design of high efficiency control units for lighting of Moscow-city objects by gas discharge high-efficient lamps
- Design of controlled electronic switching and regulating apparatuses for arc lighting Na-lamps DNaT-250
- Design of electronic controlled switching and regulating apparatuses for arc lighting Na –lamps DNaT and lighting control units for city lighting
- Design, experimental units engineering, producing and application for demonstration of controlled electronic switching and controlling devices and lighting control systems for city lighting control based on arc Na-lamps DNaT
- Energy saving technologies for streets lighting with using of new technologies and contemporary electronic components
- The sources of sinusoidal and pulse signals for high voltage testing of electrical equipment
- Design of demonstrative switching and control electronic device for tube luminescent lamps 2 x 36 W

- Design of universal intellectual drivers and power modules on their basis
- Design of power converters for auxiliary supply of the city electrical transport
- Design of power supply for airport lighting complexes
- Design of special power sources for power technological lasers
- Design of power supply for industrial arc welding
- Design of power supply for xenon pulse lamps of films projectors
- Design of low consumption power supply for personal computers

Key Publications

- ***Kalugin N.G., Chaplygin E.E.*** Influence of snubbers on inverters functioning with PWM (in Russian) // Electrichestvo, #1, 2003, pp. 42-50.
- *Kalugin N.G.* Single-phase voltage inverter with nonlinear load (in Russian) //Practical Power Electronics #11, 2003, p.p.32-34.
- *Voronin P.A., Shchepkin N.P.* Checking parameters of power transistors (in Russian) // Practical Power Electronics, #11, 2003, pp. 11-13.
- *Voronin P.A, Bonomorski O.P.* MOS Composite Static Induction Thyristor (MCS) – A New Power Semiconductor Device: Theoretical and Experimental Results. Тезисы доклада // 48 Internationales Wissenshaftlic hes Kolloquium 22-25.09.2003, Technische Universitat Ilmenau. ISS-Nr. 1619-4098.
- *Voronin P.A., Bonomorski O.P., Kukanov V.V., Shchepkin N.P.* Comparative experimental investigation IGBT modules based on combined SIT-MOP transistors (in Russian) // Appendix to the journal «Components and Technologies», #1, 2004, pp. 18-21.
- *Voronin P.A., Bonomorski O.P., Kukanov V.V., Shchepkin N.P.* Investigation of gate turn-off combined transistors (in Russian) // Appendix to the journal «Components and Technologies», #2, 2004 p.p. 27-30.
- *Panfilov D.I.* Motorola reckons on Russia (in Russian) // Electronic Components, #1, 2003, pp. 1-3.
- *Abramov A., Panfilov D.* Intellectual Systems of pneumatic tire pressure control (in Russian) // Electronic Components, #2, 2003, pp. 1-4.
- ***Panfilov D., Remizevich T., Sokolov M., Krilov E.*** Fire signaling system with radio channel (in Russian) // Electronic Components, #9, 2004, p.p. 80-87.
- ***Panfilov D., Poliakov V., Poliakov U., Objerin E.*** Control of interior lighting (in Russian) // Chip News, #2, 2004, p.p. 38-44.
- ***Panfilov D., Ivanov V.*** Analog microcircuits of Freescale Semiconductors (in Russian) // Electronic Components, #6, 2004, pp. 105-112.
- *Remizevich T.V., Archipov A.M.* Microcontrollers for motor control systems Freescale/ Motorola (in Russian) // Electronic Components, #7, 2004.
- *Panfilov D., Chepurin I., Archipov A., Sokolov M.* Components Freescale semiconductors for automobile electronics (in Russian) // Electronic Components, # 8, 2004.
- *Remizevich T., Sokolov M.* Design of built-in microcontroller systems with use of reference design of Freescale/Motorola (in Russian) // Electronic Components, # 7, 2004.
- *Panfilov D., Sokolov M.* Introduction in wireless technology ZigBee standard 802.15.4 (in Russian). // Electronic Components, # 10, 2004.
- *Sokolov M.* Soft- and Hardware wireless nets based on ZigBee technologies 802.15.4. (in Russian) // Electronic Components, #10, 2004.
- *Sokolov M., Vorobjev N.* Realization wireless nets based on technologies ZigBee standard 802.15.4 (in Russian). // Vestnic Elektroniki, # 4, 2004.

- *Chaplygin E.E., Steklenev A.E.* Two-quadrant converter with active power factor correction (in Russian). // Practical Power Electronics, #10, 2003.
- *Chaplygin E.E.* Spectral models of power factor correctors with PWM (in Russian). // Practical Power Electronics, #11, 2003.
- *Chaplygin E.E. Kalugin N.G.* Dynamic Regimes correction in power filters of voltage inverters (in Russian). // Electrichestvo, #11. 2004.
- *Chaplygin E.E., Nguen Hoang An.* The results of spectral modeling power factor correction (in Russian). // Practical Power Electronics, #15, 2004.
- Dissertations
- ***Moscovka A.A.*** Autonomous voltage inverters with simplex control. Cand. Sci. (Tech.) Dissertation, 2001
- ***Baryshnikov A.N.*** Controlled electronics switch devices for sodium high-pressure lamps. Cand. Sci. (Tech.) Dissertation, 2001 (Год???)

Patents

- Semiconductors switch device with field control / Bonomorsky O.I., Voronin P.A. Patent of Russian Federation #2199795, published 27.03.2003.

Partners

- «ELTOM», Tomilino, Moscow region
- NIIDAR, Moscow
- «Transvit», Nishny Novgorod
- «Factory named Frunze M.V.», Nishny Novgorod
- «STELLA», Zelenograd
- Organization «Reconstructia teplichnyh hozyastv», Moscow
- «GE Lighting», USA
- «Infineon Technologies AG», Germany
- Oranisation «Progector – electrotechnika», Moscow
- «Golovnoe konstructorskoe buro «Projector», Moscow
- NIKFI, Moscow
- NICTL, Shatura
- Organization «BLESK-NVF», Moscow
- VEI named Lenin V.I., Moscow
- ABB Metronika, Moscow
- «AVTOVAZ», Tolyatti
- LIAZ, Moscow region
- KAMAZ, Naberezhnye Chelny
- «Avtoelectronica», Moscow
- Electromodul', Byelorussia

Unique equipment

- Laboratory power electronics complex «Apator SA», Poland
- Laboratory research complex «Motorola», USA
- Intellectual integral power modules «Mitsubishi», Japan
- Digital phosphor oscilloscope «Tektronix' TDS 3054 (working band – 500 MHz)

IREE
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DEPARTMENT OF SEMICONDUCTOR ELECTRONICS

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The department has on its staff
18 lecturers,
2 research workers,
and 5 Ph.D. students

Head of Department:
Anatoly I. POPOV
Dr. Sci. (Tech.), Prof.

Main Lines of Research

Research supervisors

- **Physics of non-crystalline semiconductors and devices on their basis.**
  Prof. A.I. Popov, Prof. E.N. Voronkov
- **Electronic microscopy, scanning tunneling microscopy (STM) and atomic force microscopy (AFM)**
  Prof. A.I. Popov,
- **The semiconductor gas sensors and electronic nose.**
- **Low frequency noise in semiconductors and semiconductor devices**
  Prof. A.M. Guljaev
- **Optical properties of the semiconductor materials A2B6 and devices on its base**
  Prof. N.K. Morozova
- **MOS-structures and field-effect silicon transistors**
  Prof. V.S. Soldatov
- **Semiconductor VHF devices**
  Prof. A.S. Shnitnikov
- **The optical modulation spectroscopy of semiconductors**
  Assoc. Prof. V.N. Hirin
- **Vanadium oxides optoelectronic structures**
  Assoc. Prof. V.N. Kornetov
- **Solid state devices for power electronics**
  Assoc. Prof. V.A. Makarov, Assoc. Prof. N.A. Charykov
- **Electronic spectroscopy of the solid state surface**
  Assoc. Prof. I.B. Warlashov
- **IR semiconductor detectors**
  Assoc. Prof. I.N. Miroshnikova

Agreements, Contracts, Projects Supported by State Budget

- Electronic-microscopical and electron-diffraction researches of semiconducting materials
- Structural modification of amorphous Carbon properties
- Research of amorphous and nanocrystalline films and structures based on them
- Research of phenomena induced by a carrier heating in a channel of MOS-transistors,
- and methods development for control of manufacturing MOS VLSI being fast to effects of «hot» carriers
- Development of the scientific fundamentals of sensors systems intellectualization with usage of special signals and methods of their processing for research and control of mediums, objects and processes
- Researches of physical processes on a surface and phase boundaries in semiconductor structures

Key Publications

- *Popov A.I.* Unified educational informational environment – the main condition of specialist`s formation (in Russian). In the book «Open engineering education system creation». MSTU Publisher, 2003, pp. 119 – 130.
- *Popov A. I.* Medium range order and morphology of non-crystalline solids as manifestation of self-organization. X International Conference on the Physics of Non-Crystalline Solids. Parma, Italy, p. P11.
- Popov A.I. The concept of combined information system of education in MPEI (in Russian). Proc. of the Intern. Conf. «Information means and technologies», «Yanus-K Publisher, 2003, т. 3, с. 7 – 10.
- Reference book in electrical engineering, vol.3. Manufacture, transfer and distribution of he electric power (in Russian). Under edit. of Popov A.I. MPEI Publisher, 2002.
- Reference book in electrical engineering, vol.4. Application of electric power (in Russian). Under edit. of Popov A.I. MPEI Publisher, 2002.
- *Shnitnikov A.C., Vinogradov V.G., Gudkova N.B.* Design of diode UHF limiter with low level of the output power (in Russian). Proc. of the 13th Intern. Conf. UHF and telecommunications technologies». Sevastopol, Ukraine, 2003. C. 181 – 182.
- *Shnitnikov A.S., Gudkova, N.B.* Modeling and testing of an 1-stage microwave pin-diode limiter. Ibid, p.170–171.
- *Morozova N.K.* Absorbsion spectrum of ZnO, evolved in ZnSe at oxigen saturation (in Russian) // Neorganicheskie materialy, vol. 39, no. 8, 2003. Pp.1-6.
- Vasil'eva N.D., Dambis N.D., Dolgov A.V., Filikov V.A., Cherkasov A.P. Structure investigation on UHF ceramics (in Russian). Proc. of the 13th Russian symp. «Scanning microscopy and analytic investigation methods». Chernogolovka. 2003. P.125.
- *Kachalin G.V., Vasil'eva N.D., Ter-Arutiunov B.G.,* Structural features analysis of anti-erosive ion-plasmus covers for power equipment elements (in Russian). Ibid, p.135.
- *Guliaev A.M.* Molecular electronics: present and future (in Russian). Proc. of Intern. Seminar «Noisy and degradation processes in semiconductor deviced (metrology, diagnostics, technologies, academic activity). 3-6 of Dec. 2002. Moscow. VNTORES Publisher. Pp. 40-55.
- *Titov A.V., Guliaev A.M., Warlashov I.B.* Dynamic character of heterogeneous interactions and self-organization processes in gas sensors on Cu-doped SnOx. Ibid, pp.121-126.
- *Sarach O.B., Guliaev A.M., Mikhina O.B.* Surface features formation of SnOx layers at environment actions. Ibid, pp 127-132.
- *Miroshnikova I.N., Nedoruba D.A., Guliaev A.M., Yurku A.A.* On a stability problem in condition of InSb photo-resistors extended storage. Ibid, Pp. 81-87.
- *Popov A.I.* Structural characteristics on non-crystalline semiconductors. Ibid, Pp.171- 178.
- *Morozova N.K., Karetnikov I.A., Gabrischuk E.M., Lisitsun V.M., Korepanov V.I., Oleshko V.I.,* Bound exciton on O2 centers in ZnSe. Ibid, pp. 179-184.
- *Khirin V.N.* Photoelectric and electromodulation spectroscopy of ZnxCd1-xSe monocrystal absorbsion edge/ Ibid, pp. 190-195.
- *Vasil'eva N.D., Kornetov V.N., Khanin V.A., Yurov D.V.* Statistical regularities of surface micro-roughness distribution of zinc oxide films. Ibid, pp. 210-214
- *Savinov I.S., Dudnikov A.S., Voronkov E.N.* The analysis of non-stability reasons of thin under-bolting dielectric of MOS transistors. Ibid, pp. 215-220.
- *Fairushin A.R., Savinov I.S.* Generation of the streamer breakdown in thin films of the glassy semiconductors. Ibid, pp. 224 -228.
- *Makrousov V.V.* Color features of the thin films of colored conductors. Ibid, pp. 229-234.

- *Voronkov E.N.* Standard technologies CASE application for the computer learning support. Ibid, pp. 299-302.
- *Guliaev A.M.* From microelectronics towards nanoelectronics. A flikker noise problem. Vestnik MEI. No. 4 2003. Pp.100-104
- Miroshnikova I.N. Photo-resistors on the base of indium antimonide; development review. Ibid, pp. 104-110
- *Mirishnikova I.N.* Low frequency noise of the indium antimonide photo-resistors. Vestnik MEI, 2004/ no. 5, pp. 91-97
- *Guliaev A.M., Mukhina O.B., Belousov M.L., Prikazchikov D.A., Slepniova M.A.* Gas analyzer prototype on the base of a metal-oxide sensors matrix. Proc. of the Intern. Seminar «Noisy and degradation processes in semiconuctor devices» MPEI Publisher, 2003, pp. 124-128.
- *Timashev I.S., Zav'ialov S.A., Guliaev A.M., Mukhina O.B., Solov'iova A.B.* Immobilizated protoporfirin carbonyl derivatives as catalyzers of gas sensors response fulfilled on the base of nano-crystalline SnO2 films. Ibid, pp. 129-134
- *Guliaev A.M., Titov A.M., Mukhina O.B., Warlashov I.B.* The relaxation phenomena in SnO2 gas sensors at heterogenic reactions // Proc. of the XXI Intern. Conf. «Nonlinear processes in solid bodies» (RPS-21) (Voronezh, 5-8 of Oct. 2004) VGU Publisher, p. 61
- *Morozova N.D., Karetnikov I.A., Gavrishiuk E.M., Plotnichenko V.G., Yashina E.V., Ikonnikov V.B.* CVD-ZnS luminescence centers conversion at gas-static conditions. FTP. 2004. Vol. 38, no.1, pp. 39-43.
- *Blinov V.V., Morozova N.K.* Optical features of the centers, formed by oxigen and copper presence in A2B6 materials (ZnSe as an example). Proc. of the XII Conf. «High-clean substances and materials. Synthesis, analysis and application». May 31st – June 4th 2004. IHVV (N. Novgorod). Pp..296-298.
- *Morozova N.K., Karetnikov I.A., Golub K.V., Gavrishiuk E.M., Yashina E.V.* Gas static conditions influence on a luminescence and balance of intrinsic defects in ZnS. Ibid, pp.216-222
- *Popov A.I.* Atomic structure and structural modification on glass. In: Semiconductors and semimetals. vol.78, chapter 2, 2004, Elsevier, p.51-95

Dissertations

- Blinov V.V. Optics properties of the centers obliged to presence to oxygen and copper in A2B6 compound (on example ZnSe). Cand. Sci. (Tech.) Dissertation, 2003.
- Sarach O.B. Creation of gas sensors on the basis of tin dioxide thin films. Cand. Sci. (Tech.) Dissertation, 2003.
- Titov A.V. Research of dynamic operating modes of gas sensor controls with the purpose of increase of their selectivity. Cand. Sci. (Tech.) Dissertation, 2004.
- Fajrushin A.R Influence of an electric field on electronic processes in amorphous semiconductors. Cand. Sci. (Tech.) Dissertation, 2004.
- Nedoruba D.A. Research of time stability and modeling of parameters of photodetectors from antimony Indium with the purpose of their design and technology optimization.
- Cand. Sci. (Tech.) Dissertation, 2004.

Partners

- Science and production association «Alfa», Moscow
- Science and production association «Pulsar», Moscow
- «The Moscow plant Sapphire «, Moscow

- The research institute of materials technology, St-Petersburg
- The research institute of Molectronics, St-Petersburg
- Institute of chemistry of high-clean materials, Nizhni Novgorod

The unique equipment

- The machine for research a surface elemental composition of solids by methods XPS,
- Auger, UVS- and mass spectroscopy LHS-10
- The plant for researches of charge phenomena in MOS-structures and by methods of the volt-farad characteristics, thermo-stimulated ionic currents, charge pumping
- The automated plant for research of noise performances of semiconductor frames and devices
- The installations for researches of an optical behavior of semiconductors by methods
- IR, electro-modulation spectroscopy, spectro-photometry
- The production equipment for deposition of thin dielectric and semiconductor materials by plasma, jet cathode and thermal sputtering
- The plant for research of gas sensors
- The scanning electron microscope
- The scanning tunneling microscope (STM)
- The atomic force microscope (AFM)

IREE DEPARTMENT OF GENERATION OF OSCILLATIONS AND SIGNALS

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The department has on its staff
15 lecturers,
1 research workers,
and 6 Ph.D. students,

Head of Department:
Nikolai N. UDALOV
Dr. Sci. (Tech.), Prof.

Main Lines of Research

Research supervisors

- **Investigation of phase and amplitude fluctuations in devices and systems used for signal generation and in its functional units**
  Prof. V.N. Kuleshov, Assoc. Prof. T.I. Boldyreva
- **Synchronization systems for communication channels with complex signals**
  Prof. N.N. Udalov
- **Frequency synthesis, systems of radio electronic measurements and secretive communication using complex wideband signals**
  Prof. L.A. Belov, Assoc. Prof. V.V. Chilkevitch
- **Systems of frequency and phase control and chaotic oscillations in nonlinear systems**
  Prof. M.V. Kapranov
- **Design of nonlinear power units for signal generation systems**
  Assoc. Prof. G.I. Koptev
- **Microwave and millimeter wave oscillations sources with extremely low phase noise**
  Prof. D.P. Tsarapkin
- **Millimeter wave devices for communication and measurements**
  Leading Researcher A.V. Khrunov

Agreements, Contracts, Projects Supported by State Budget

- Generation of complex signals with precise parameters
- Investigation of potential accuracy of chaotic signals generation, syncronization and allocation in niose presence
- Development of a new generation of laboratory complexes (methodical documents, equipment and software) for the course «Signals generation»
- Development of secretive communication systems on the base of ultra-wide-band and chaotic signals
- Development and application of signal sources with precise parameters for sensors and communication systems
- Design and development of microwave frequency synthesizers
- Research and development of microwave transistor oscillators with low power consumption optimized with respect to output power, efficiency and PM noise

Key Publications

- **Belov L.A.** Frequency Converters (in Russian). Elektronika-nauka, tehnologiya, biznes. 2004, № 2 (52), pp. 44-51.
- **Belov L.A.** Stable Frequency Synthesizers Components. Voltage Controlled Oscillators. (in Russian). Elektronika-nauka, tehnologiya, biznes. 2004, № 1, pp. 42-47.

- **Belov L.A.** Stable Frequency Synthesizers (in Russian). Elektronika-nauka, tehnologiya, biznes. 2004, № 3, pp. 38-44.
- **Belov L.A.** Frequency and Signal Synthesizers (in Russian). SCIENCE-PRESS Publisher, 2002.
- Belov L.A. Clock Oscillators (in Russian). Elektronika-nauka, tehnologiya, biznes. 2004, № 6 (56), pp. 3-8.
- Kuleshov V.N., Boldyreva T.I., Perfilyev A.A. Development of Fluctuation Research Methods by S.I. Evtyanov's Scientific School (in Russian). Proc. of LVIII scientific session devoted to Radio day, Moscow, VNTORES Publisher. 2003, vol 2, pp.20-22.
- Kapranov M.V., Kuleshov V.N., Udalov N.N. Regular and Chaotic Dynamics of Phase Locked Loops (on the 50th Anniversary of the Origination of PLL Scientific School at the Department of Radio-transmitting devices of Moscow Power Engineering Institute) (in Russian). Ibid, pp.29-32.
- Kuleshov V.N., Boldyreva T.I., Perfilyev A.A., Prokofiev V.A. Development of Low-noise Voltage Controlled Microelectronics Oscillators Design Methods (in Russian). Proc. of the Conf. «Electronika» 17 November – 11 December, 2003, Moscow.
- Kuleshov V.N., Boldyreva T.I., Perfilyev A.A., Prokofiev V.A. Polyharmonic Analysis and Parametric Synthesis of Low-noise Voltage Controlled Oscillators. Ibid.
- Boldyreva T.I. PM and AM Noise in BJT Amplifiers due to Fluctuations of Supply Voltages. In Proceeding of 18-th European Frequency and Time University of Surrey Cuildford, UK, 5-7 April, 2004.
- Kuleshov V.N., Boldyreva T.I., Perfilyev A.A.. PM and AM Noise in Voltage Controlled Oscillators. Ibid
- Kuleshov V.N., Mordvinov A.E.. PM and AM Noise in Voltage Controlled Phase Shifters. Ibid.
- Perfilyev A.A., Kuleshov V.N., Boldyreva T.I., Prokofiev V.A.. Application of Polyharmonic Method for Analysis and Parametric Synthesis of Low-noise Voltage Controlled Oscillators (in Russian). Noise and Degradation Processes in Semiconductor Devices. Transactions of International Scientific Workshop, 2004, pp. 253-261.
- Kuleshov V.N., Perfilyev A.A., Boldyreva T.I.. PM and AM Noise Calculation in Voltage Controlled Oscillators. In Proceeding of the 2nd IEEE International Conference on Circuits and Systems for Communications (CD), Moscow, 30 June – 2 July 2004.
- Khilkevich V.V., Lapitsky V.V. Classification of Signals with Digital Modulation by Neural Network. Abstract. VII International Conference of Young Researchers – Wave Electronics and Its Applications in the Information and Telecommunication Systems. 12-15 September, 2004 St.Petersburg-Valaam-St.Petersburg. St-Petersburg, 2004.
- Khilkevich V.V. Hardware Implementation Of Dynamical Neural Networks Suitable For Online Training. Proceedings of the 2nd IEEE International Conference on Circuits and Systems for Communications. June 30 – July 2, 2004, Moscow, Russia

Patents

- **Belov L.A.** Modulator of Signals. Certificate № 20004129094 (RF), priority dated 06 Oct. 2004 .

Dissertations

- Tsarapkin P.D. Methods of microwave oscillations generation with minimal phase noise. Doct. Sci. (Tech.) Dissertation., 2004.
- Lebedinsky A.A. Communication Systems with Digital Generator of Chaotic Carrier: Cand. Sci. (Tech.) Dissertation. 2003.

- Tomashevsky A.I. Generation of Chaotic Oscillations by Phase Control Systems. Cand. Sci. (Tech.) Dissertation. 2003.

Partners

- Russian Research Institute of Radio Engineering, Moscow
- Institute of Radio Engineering and Electronics of Russian Academy of Science, Moscow
- Mariy-El State Technical University, Yoshkar-Ola
- Moscow Research Institute of Instrument Designing, Moscow
- Ecole Nationale Politechnique, Toulouse, France
- Special Research Bureau of MPEI, Moscow
- Russian Science-Industrial Association «Rosuchpribor», Moscow
- St-Petersburg State Electrotechnical University, St-Petersburg
- Russian Research Institute of Space Equipment, Moscow
- Vladimir State University, Vladimir, Russia

IREE DEPARTMENT OF RADIO ENGINEERING FUNDAMENTALS (REF)

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Staff:
23 teachers,
4 researchers,
6 Ph.D. students.

Head of Department Ph.D., Professor
Vyacheslav A. Grechikhin

Main directions of research

The scientific chiefs

- **Application of high-temperature superconductivity phenomenon in microwave electronics**
  Ph.D., Prof. Lobov G.D., Ph.D., Sr. research fellow Zhgoon S.A.
- **Study of acoustic properties of thin-film and layered materials**
  Ph.D., Prof. Lobov G.D., Ph.D., Sr. research fellow Zhgoon S.A.
- **Development of functional devices for signal processing**
  Ph.D., Assoc-prof. Shtykov V.V.
- **Development of medical diagnostic equipment based on PC**
  Ph.D., Assoc-prof. Shtykov V.V.
- **Development of passive location systems for security applications on the basis of PC**
  Ph.D., Assoc-prof. Shtykov V.V.
- **Development of a PC base the universal testing bench for student laboratory work related to electrical and electronic engineering curriculum.**
  Ph.D., Assoc-prof. Shtykov V.V.
- **Development of the automated hardware-software complexes for research of the characteristics of radio engineering models and objects**
  Dr.Sc., Prof. Kartashov V.G., Ph.D., Assoc-prof. Pollak B.P.
- **Research of photo-receiving devices characteristics on the basis of available charge-coupled devices and development of image processing methods**
  Ph.D., Assoc-prof. Razumov L.A., Ph.D., Prof. Grechikhin V.A.
- **Development of signal processing digital methods for ultrasonic non-destructive testing, laser anemometry and particle image velocimetry.**
  Dr.Sc., Prof. Kartashov V.G., Ph.D., Prof. Grechikhin V.A.
- **Research and development of millimeter wave devices on high-anisotropic gyro-magnetic materials**
  Ph.D., Assoc-prof. Pollak B.P.
- **Development of transmission lines and electromagnetic energy transmitters for millimeter waves therapy instrumentation.**
  Dr.Sc. Prof. Vzyatyshev V.F.
- **Development of methods and devices for signals processing and analysis for the tasks of medical diagnostics**
  Ph.D., Assoc-prof. Kramm M.N.
- **Research of physical and technical properties of composite materials on the basis of high-anisotropic ferrite and creation of UHF and millimeter waves range devices on their base**
  Ph.D., Assoc-prof. Pollak B.P.

The contracts

- Electronic devices with high-temperature superconductors

- Study of acoustic waves in layered thin-film materials
- Research of wavelet-transform methods for fluid flows visualization with computer modeling.
- Development of spatial-temporary signal processing methods for ultrasonic non-destructive testing.
- Research of electromagnetic fields visualization methods inside of wave-guides and resonators
- Computet modeling of estimation methods of spaced carried small-sized objects characteristics on the base of their dynamic images
- Development of digital methods of filtration and analysis of physical fields visualization images
- Development of designing principles of flexible transmission lines for a millimeter-wave band
- Development of radio-absorptive composite magnetic medium and devices for maintenance of ecological safety of electromagnetic fields sources
- Development of a new class of highly anisotropic composite ferromagnetic materials and their application in electronic components

Main publications

- V.A.Grechikhin, B.S.Rinkevichius The Maximum Likelihood Method For Separation of PIV-Images Of Particles in Two-Phase Flows by Size Criterion // 5th International Symposium on Particle Image Velocimetry, Busan, Korea, September 22-24, 2003. 4 c.
- V.A.Grechikhin, I.L. Raskovskaya, B.S.Rinkevichius, A.V. Tolkachev. Laser-Beams Interference with Existence of Acousto-Optic Effect. / Quantum Electronics 2003, №8, pp.742-746 (in Russian)
- V.A.Grechikhin, B.S.Rinkevichius Method of Selection by Dimensions of PIV-Particle Images in Two-Phase Flows // Proc. of the 7-th Int.Conf «Optical Methods of Flow Investigation», Moscow, 2003 (in Russian)
- B.P. Pollak, L.I. Peich, D.A. Tochilin, A.V. Arefiev, S.V. Puchnin. Computer-Based Generating-Measuring System for Investigation of Electrical Circuits and Signals. // Vestnik MEI. 2003, № 4, p.92-99. (in Russian).
- E.V. Shalimova. Selected Properties of Split-Signal and Its application in Ultrasonic Nondestructive Testing. – Radiotekhnicheskie tetradi, №26, 2003. – p.58-61. (in Russian).
- V.G. Kartashov, E.V. Shalimova. Split-Signal, properties and processing methods. Proc. of the National Russian Conf. "Super-Wideband Signals in Radars, Communications and Acoustics". Murom, 1–3 July 2003, p. 322–325. (in Russian)
- E.V. Savchenko, L.A. Razumov, B.S. Rinkevichius. Determination of the Gaussian Beam Focal Point Location by Weighting Method in Matrix Photo Receiver // Izmeritelnaya tekhnika. 2003. No 10? Pp. 48-50 (in Russian)
- M.N. Kramm, G.V. Zhikhareva, Lebedev V.V. Reconstruction of Surface Current Sources Distribution in a Biological Object. Proc. of Popov Russian Society, issue LIX-2, 2004, pp. 67-68. (in Russian)
- M.N. Kramm, G.V. Zhikhareva, E.V. Malakhov. Biological Heart Activity Model. Proc. of the Intern. Conf. «Analysis and Synthesis as Methods of Scientific Knowledge». Part 2, Taganrog, TRTU, 2004, pp.6 – 8. (in Russian)
- V.V Shtykov and others. Potential Possibilities for Improvement of Information Characteristics of Acoustoelectronic Correlation Processors. Radiotekhnika i Electronika, 2004, 4, pp. 1-6. (in Russian)

- V.V. Shtykov, D.M. Bosyi. Resolution of Passive Sound Location. Radiotekhnicheskie tetradi, № 30, 2004. (in Russian)
- Korsakov I, Romanov M., Kaul A.R., Bolshakov , Wahl G., Zhgoon S.A. MOCVD of KNbO_3 Thin Films", April 29, 2003 in symposium V1, "CVD XVI and EUROCVD 14", as a part of the 203rd Meeting of The Electrochemical Society in Paris, France from April 27-May 2, 2003.
- A.E Barinov, S.A. Zhgoon, O.M. Shteynberg, G.D. Lobov, P.B. Mozhaev. Properties of High Temperature Superconducting Films. Proc. of the 5-th ICEEE 2003 part.1 Crym, Aloushta, Ukraine. 2003, pp.258-261. (in Russian)
- A.S. Shvetsov, S.A. Zhgoon, G.D. Lobov. Acoustic Wave Reflection Coefficient for Metallic Gratings. Ibid, pp.300-303. (in Russian)
- O.M. Shteynberg, S.A. Zhgoon, G.D. Lobov. Properties of Non-contact Rotating Coupler for RF Signals. Ibid, pp.304-307. (in Russian)
- Doberstein S., Shvestov S., Zhgoon S., Low-Loss NSPUDT SAW filters with inclined reflective arrays, Proceedings of International Ultrasonics Symposium 2003, Honolulu 5-8 October 2003, pp. 2077-2080.
- A.S. Shvetsov, S.A. Zhgoon. Calculation of Acoustic Wave Reflection Coefficient for Metallic Gratings. Proc. of the 12-th ICSEGE, 19-21 December 2003, Firsanovka, Moscow, pp. 495-504. (in Russian)
- O.M. Shteynberg, S.A. Zhgoon, G.D. Lobov. Influence of Non-contact Rotating Coupler Connection to a Resonator on Its Frequency. Ibid, pp. 505-515. (in Russian)
- A.E Barinov, S.A. Zhgoon, O.M. Shteynberg, P.B. Mozhaev. Evolution of High Temperature Superconducting Lumped Element Filters with Planar Spiral Inductors. Ibid, pp. 486-494. (in Russian)
- Zhgoon S., Shvetsov A., Shteynberg O., Bhattacharjee K., Flowers J. Approach to On-wafer Controllable Trimming of SAW Filters, Proceedings of UFFC IEEE International joint conference 2004, Montreal.
- Zhgoon S., Bhattacharjee K., Loseu A., Rao J., Flowers J. Modeling of Electromagnetic and Acoustical Properties of RF SAW Filters from On-Chip Layout Including all Electrodes and Comparison with Experimental Data. Ibid.
- Zhgoon S.A., Shvetsov A.S., Sakharov S.A., Semenov V.V., Semenova E.N, Dobershtein S.A. NSPUDT Structures with Inclined Reflectors on Langasite, Ibid.
- O.M. Shteynberg, S.A. Zhgoon, G.D. Lobov. Analysis of Resonator Connection to RF Rotating Coaxial Coupler. Proc. of the 5-th ICEMC, Alushta, Ukraine, 20-25 September, 2004, pp. 179-181. (in Russian)
- A.E Barinov, S.A. Zhgoon, O.M. Shteynberg, G.D. Lobov, P.B. Mozhaev. Investigation of Properties of High Temperature Superconducting Thin Films. Ibid, pp. 182-184. (in Russian)

Dissertations

- Savchenko A.V. Digital algorithms of signal processing in measuring optoelectronic systems. Cand. Sci. (Techn) Dissertation, 2004.
- Kudriashov T.V. Research and development of estimation methods of LDA signal parameters with the aid of continuos wavelet analysis algorithms. Cand. Sci. (Techn) Dissertation, 2004.

Partners

- The All-Russia research institute on medical instrumentation, Moscow
- Institute of Radio Engineering and Electronics of Russian Academy of Science (IRE RAS), Moscow

- The Moscow medical academy, Moscow
- The Oxford university (technical faculty), Great Britain
- The Special Research Bureau of MPEI, Moscow
- Clarisay Inc. Dallas TX, USA
- The Russian research-and-production association "Rosuchpribor", Moscow

Unique equipment

- The technological complex on manufacturing of devices on the basis of metal, dielectric and high-temperature superconducting film materials by vacuum deposition and photolythography
- The automated measuring bench for research of cryogenic UHF devices characteristics
- The hardware-software complex for research of the characteristics of electrical signals and circuits

IREE
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DEPARTMENT OF RADIO RECEIVERS (DRR)

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The department has on its staff
23 Professors and associated professors,
13 scientific researchers,
8 Ph.D. students

Head of Department
Dr.Sc. (Eng.), Ph.D. (Eng), Professor
Sergey M. SMOLSKIY
Member of International Academy
of Higher educational Institutions;
Of International Academy
of Electrotechnical Sciences,
Of International Academy
of Informatrization

■ Basic directions of scientific investigations

Leader of scientific direction

- **Development of radio measuring systems and devices for energy industries and enterprises**
  Prof. Smolskiy S.M., Prof. Bogatyrev Y.A.
- **Electromagnetic compatibility: constructive methods of ensuring**
  Prof. Pokrovskiy F.N.
- **Screened and unclosed dielectric resonators of very high frequency range**
  Assoc. Prof. Dobromyslov V.S.
- **Development of methods of synthesis and analysis of frequency selection microelectronic circuits with given parameters of quality**
  Prof. Bogatyrev Y.A., Head of research lab Savkov N.N.
- **Design of microelectronic devices on the base of system theory**
  Prof. Grebenko Yu.A.
- **Development of precision radar measurers of distance for systems of the automatic check and control of technological processes in energetic, oil, gas, metallurgical, chemical complexes and in other industries**
  Prof. Smolskiy S.M., Res. Plescheev V.I., Res. Trofileev A.A.
- **Development of spatially distributed systems of gathering, storage, remote transfer and handling of the information**
  Prof. Bogatyrev E.A., Prof. Grebenko Yu.A.
- **Development of technologies and tools for electronic text-books on digital signal processing**
  Assoc. Prof. Muro E.L.
- **Digital complex filters**
  Prof. Grebenko Y.A.
- **The simulation and development is hardware-integrated multifunction complexes for modern board and ground radar-tracking systems. Radar-tracking detection and measuring of parameters of dense multiple targets in a mode of the independent review.**
  Assoc. Prof. Antonov-Antipov Yu.N.

- **Searching of spatial filtration algorithms, invariant to non-ideal antennas and receiving devices of radio electronic systems. Smart antennas**

  Associated professor Lishak M.Yu.
- **Development of remote devices for functional diagnostics of different physical nature objects (analysis of man functional condition, examination of mechanical installations vibrations etc.)**

  Sr. researcher Fedorov V.A.
- **Creation of portable radio communication devices for mobile operators located in zones of increased danger (extreme situations) and making a local part in systems of operative personnel management**

  Head of lab Savkov N.N.
- **Development of methods and systems of an automated multi-criteria choice of systems and components design variants**

  Prof. Kandyrin Y.V.
- **The analysis and synthesis of the microelectronic equipment thermal modes**

  Prof. Kandyrin Y.V.
- **Development of methods of optimum plans creation for a repair beginning of complex technical systems**

  Prof. Kandyrin Y.V.
- **Synthesis of signal processing algorithms in navigating receiving devices of space complexes such as GLONASS and GPS, effective in unfavorable noise and handicap circumstances**

  Associated professor Antonov-Antipov Yu.N.
- **Radio receivers of very high frequency range for measurers of non-electrical quantities**

  Sr. researcher Osipov E.E.

The contracts, agreements, budget researches

- Research and development of sensors for determination of transport streams parameters
- Development of the radar-tracking module of the transport detector system
- Designing, manufacturing and test of a computer radar-tracking measuring complex PULSAR for remote measuring of a functional condition of a patient
- Development of complex models of multi-target RADAR with modular phased-array antenna, intended for control of artillery installations fire in a mode of target locking on a background of shells plural breaks
- Development of operation principles and technical means of the efficient and effective portable radio communication systems for the local mobile personnel control who are acting in zones of increased danger
- Diagnostic wireless informational-measuring complex for the operative express control of thermal and atomic power stations parameters, and also other extended power objects
- Development of signal indicators of bins filling in systems of ash cleaner of thermal power plant output gases
- Development of the automated system and components of software complex of comparative analysis and alternatives choice
- Development of a software for an automated system of a multi-criteria choice
- Development of a interactive multi-criteria design methods for the heat regimes of radio electronic units
- FPGA based designing of the digital signal processing units for the precision radar measuring system for small displacement

- Forwarding of combined modulated radio signals through linear and non-linear units of the radar systems
- Analysis and development of multi-criteria choice methods for standard components analogs of radio equipment
- Development of educational materials for automated designing system PCAD .2001
- Development of a heuristic algorithm for multi-layer HF printed circuits designing
- Comparative analysis of signals with compact spectrum used in the modern systems of data transfer

Key publications

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- Smolskiy S.M., Fedotov A.M. An analysis of frequency-modulated radar autodynes with the help of Evtianov`s symbolic abbreviated equations method (in Russian). LVIII Scientific Session. Proceedings. Volume 2. P. 27. 2003.
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- Lishak M.Y. Software package for digital speech signals processing (in Russian). Ibid. P. 39.
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- Ivanova E.P., Smolskiy S.M., Khanamirov A.Y., Khrunov A.V. About radio waves checking in thermal power station gas exhaust tract (in Russian). *Vestnik MEI.* MPEI Publisher, 2004, No. 1, p. 64.
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- Veles Diaz H.C. Detection characteristics of narrow-band PM-2 signal for different transfer speed (in Russian). *Vestnik MEI.* MPEI Publisher, 2003, No. 2, p. 65.
- Smolskiy S.M., Bogatyrev Y.A., Chernyshov V.I., Chernyshov Y.I., Schukin A.V., Filatov V.A. etc. Equipment for electro-chemical processes optimization for extracting metal from solutions and deep purification of the galvanic drainage (in Russian). *Vestnik MEI.* MPEI Publisher, 2004, No. 5. Pp.98-105.
- Veles Diaz H.C. Detection algorithm for PM-2 signals at low signal/noise ratio (in Russian). *Radiotechnicheskie tetradi,* 2003. No. 27. Pp. 76-78.
- Kraiachich A.V. Heat regimes analysis in system «IMC case – Radiator» (in Russian). *Radiotechnicheskie tetradi,* 2003, No.26, p. 54.
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- Vйlez Dнaz J.C., Antonov-Antipov Y.N. Deteccivn de secales DS/CDMA/BPSK de baja relaciyn secal a ruido en presencia de ruido blanco e interferencia por acceso mьltiple. VIII Simposio de Tratamiento de Secales, Imбgenes y Visiyn Artificial. Nov. 5-7, 2003, Medellнn. Pag. 38.

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- Kandyrin Y.V., Kurbatova E.N. Adaptive dynamic criterion structuring of alternatives in multi-criteria choice systems (in Russian). Ibid, P. 13.
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- Grebenko Y.A. System design of uniform devices for signal processing. *Dr. Sci. (Techn.) Dissertation,* 2003.
- Kurbatova E.N. Methods and systems development for automated choice of typical components of electronic equipment. *Cand. Sci. (Techn.) Dissertation,* 2004.
- Rembovskiy A.M. Theoretical investigations, development and implementation of radio systems family for automated radio monitoring, direction finding and sources of electromagnetic emission. *Dr. Sci. (Techn.) Dissertation,* 2004.
- Veles Diaz H.C. Methods and devices for unified processing of communication and navigation signals in compact satellite stations. *Cand. Sci. (Techn.) Dissertation,* 2004.

The partners

- State research-and-production Association "Altair", Moscow
- Research and development institute of computer complexes, Moscow
- Research-and-production association «Special technique and communication», Ministry of internal affairs, Russian Federation, Moscow
- Mechanical Engineering Research Institute of Russian Academy of Science (RAS), Moscow
- Research-and-production association "Impulse", Moscow
- Research-and-production association "Delta", Moscow
- Moscow Academy of Thin Chemical Technologies named after M.V. Lomonosov (Moscow)
- Moscow technical university of Radio Engineering, Electronics and Automation.
- Institute of higher nervous activity and neurophysiologies of RAS, Moscow
- Research and development institute of automation equipment on a railway transportation, Moscow
- Service Center of the company "M-Video", Moscow
- Educational-research Center «High radio-electronic technologies in medical electronics», created at participation of DRR in Institute of medical instruments and technologies" at Yonsei University (Seoul, Republic of Korea)
- The company SINUS-TEC Co. Ltd (Seoul, Republic of Korea)
- The Beijing Institute of Technology (Faculty of electronics and communication), Beijing, Peoples Republic of CHINA
- The company CML (Great Britain)
- Corporation Texas Instruments Corp. (USA)
- Institute of Radio Engineering and Electronics of RAS, Moscow
- Non-governmental educational institution TAKIR, Moscow
- Microteam Company, Moscow

Unique equipment

- Complex of means of mathematical and semi-natural model operation of correlation measurers of velocity
- Radar-tracking computer complex for remote diagnostics of a functional condition of the man
- Complex for automation of technological processes of metals extraction from solutions and high cleaning of galvanic sinks
- Small-sized equipment for organization of low-level radio communication of operative groups
- System of gather, processing and remote transmission of the technological information on power enterprises at a heightened level of noise and handicaps
- High Precision RADAR level meter of millimeter wave range

IREE DEPARTAMENT OF RADIO ENGINEERING SYSTEMS (RES)

REF

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The department has on its staff
10 Professors and associated professors,
7 Ph. D. students

Head of Department Ph. D. (Eng)
Professor Yuri A. Yevsikov

Basic Directions of Scientific Investigations

- **Complex amplitudes method development for statistical analysis and simulation of radio engineering devices and systems**

  Professor Yevsikov Yu. A.
- **Theory and statistical synthesis methods of the digital radio engineering systems and devices at full and inexact prior information**

  Professor Pervachev S. V.
- **System analysis of complex engineering systems**

  Professor Gubonin N. S.
- **Performance modulation methods of signal distortion in transponder transceivers nonlinearity of satellite communication**

  Associated professor Borisov V. A.

The contacts, agreements, budget researches

- Performance modulation methods of signal distortion in transponder transceivers nonlinearity of satellite communication and navigation net
- Investigation, analysis, classification and selection of modes and products for the satellite multi-protocol transport net of fixed service
- Performance modulation methods of signal distortion in transponder transceivers nonlinearity of satellite communication and navigation
- Ambigity elimination procedure in the task of signal source height measurement using new signals processing principle
- Development of algorithms and software for lossless and near lossless compression of multispectral still images.
- Millimeter–wave short–range radar

Basic Publications

- Borisov V.A., Ananjev N.A. Potential noise immunity of code division signal receiving and its
- comparison with noise immunity of multi-user detectors. // Proc. of the Int. scientific conference «Modern radioelectronics and ideas of V.A. Kotelnikov». MPEI Publisher, 2004. PP. 76-77.
- Babkin V. F., Knizhny I. M., Khrekin K.Y. Lossless and near lossless compression of multispectral images. // Paper. Published in digest papers of Russian Space Research Institute's seminar «Modern and perspective developments and technologies in the space instrument-making.» Edited by R.R. Nazirov — Moscow.: Publishing house of Space Research Institute (IKI) Russian Academy of Sciences (RAS), 2004. pp. 87-94.
- Babkin V. F., Knizhny I. M., Khrekin K.Y. Multispectral images compression for problems of remote sensing of Earth from Space. // Proc. of the All-Russia conference «Current aspects of remote sensing of Earth from Space». Publishing house of Space Research Institute (IKI), Russian Academy of Sciences (RAS), November 2003, pp. 23-28.

- Babkin V. F., Knizhny I. M., Khrekin K.Y. Lossless and near lossless compression of still grey-scale images. // Proc. of the 11-th All-Russia conference «Mathematical methods of image identification MMRO-11». Puschino. Publishing house of Computing Centre of Russian Academy of Sciences (RAS), 2003. pp. 44-49.
- Mokhnatkin A.A. Signal distortion simulation in nonlinear devices. // Vestnik MEI, 2003, no.3. pp. 79-84.
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- Boldenkov E.N. The analysis of optimal tracking systems noise immunity of the satellite navigation systems receiver». //Thesis's of the reports in scientific technological conference of FSUE "RISDE", 2003. p. 41.
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- Boldenkov E. N. Statistical analysis of a combined system of signal phase tracking in receivers for satellite navigation. // Radiotekhnika. Statistical synthesis of radio electronic systems, 2004, no. 7. pp. 29-35.

Patents

- Patent (RU) 2231081. Echo ranging system / D.M. Bosyi //BI 20.06.04
- Patent (RU) 2229843. Multi-channel electronic stethoscope / A.V. Antonov // BI 10.06.04
- Patent (RU) 2234633. Method for settling down detrimental aerosols / B.S. Melnikov et al. // 20.06.04
- Patent (RU) 2213942. Device for contact-free measurement of temperature / V.N. Bodrov, B.S. Melnikov, G.I. Obidin // BI. 2003. №28.
- Patent (RU) 2200331. Position measuring device for moving radiating object / N.I. Maksimov // BI 2003. №7.
- Patent (RU) 2201137. Device for evaluating human vertical posture stability / P.V. Dorovatovsky // БИ. 2003. №9.
- Patent (RU) №2207727. Combined GSM communication system / A.N. Galdin // BI. 2003. №18.
- Patent application 2003106116 (RU) "Device for decoding the convolutional codes"./A. V. Semenov// 05.03.03. 20.

The Partners

- Federal State Unitary Enterprise «Special Research Bureau of MPEI», Moscow
- State research-and-production Association «Altair», Moscow
- Enterprise SWIT, Moscow
- RAO EES of Russia, Moscow
- Federal State Unitary Enterprise "Russian Institute of Space Device Engineering" (FSUE "RISDE")

Unique equipment

- Equipment NDS550, NSD70D, NSD570 for relay protection commands transmitting
- Equipment AES 550 for relay protection and anti-crash automation commands transmission
- Equipment ETL500 and SDH/PDH and telecommunication platform for high-frequency communication

DEPARTMENT OF ANTENNAS AND RADIO WAVES PROPAGATION

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The department has on its staff
16 lecturers,
6 researchers,
and 5 Ph.D. students

Head of Department:
Sergey E. BANKOV
Dr. Sci. (Tech.), Prof.

Main Lines of Research

Research supervisors

- **Analysis of propagation and diffraction of electromagnetic waves with complex structure on the basis of hybrid numerical asymptotic methods**
  Assoc.Prof. V.V. Solodukhov
- **Design principles for novel antennas used in various modern radio engineering systems and devices**
  Prof. D.M. Sazonov and Assoc. Prof. V.V. Bodrov
- **Propagation and diffraction of electromagnetic waves in inhomogeneous and nonlinear media**
  Prof. V.A. Permyakov
- **Mathematical modeling of radiation and propagation of pulsed signals**
  Prof. V.A. Permyakov
- **Computer-aided telephony**
  Assoc. Prof. V.I. Sourkov and Assist. Prof. I.V. Sourkova
- **Design principles for novel planar antennas for microwave and millimeter wave ranges**
  Prof. S.E. Bankov
- **Novel millimeter wave hybrid integrated circuits**
  Prof. S.E. Bankov
- **Industrial applications of millimeter wave radars**
  Prof. S.E. Bankov
- **Electromagnetic simulation of photonic band gap crystals**
  Prof. S.E. Bankov

Agreements, Contracts, Projects Supported by State Budget

- Mathematical modeling of advanced antennas and processes governing propagation and diffraction of electromagnetic waves in real conditions
- Development of the hybrid physical theory of diffraction for dielectric and metal-plus-dielectric bodies in quasi-optical wave band on the basis of an extended concept of elementary edge modes and the numerical solution of new canonical problems
- Applied technique for calculation of radar radiation fields in the troposphere with a prescribed vertical profile of the refraction index
- Analysis of the effect of the radio-signal propagation medium on operation of the synthetic-aperture radar
- Fundamental problems of ultra-wide-band radar
- Design and mathematical modeling of planar antennas for stationary and mobile satellite TV systems
- Design of industrial control systems on the base of millimeter wave radar with frequency modulation

- Research and development of double-sided slot wave-guide hybrid integrated circuits and their applications in millimeter wave radar

Key Publications

- Permiakov V.A., Isakov V.M. Description of super wide band pulse signals in terms of electrodynamics (in Russian) // Proc. of the Int. scientific conference «Modern radioelectronics and ideas of V.A. Kotelnikov». MPEI Publisher, 2004. PP. 43-45.
- Permiakov V.A., Isakov V.M. About evaluation of super wide band signals of decimeter wave range distortion in ionosphere (in Russian) // Proc. of the Russian scientific conference «Super wide band signals in radiolocation, communications and acustics». Murom, 2003, pp. 276-280.
- Ka Min-Ho, Baskakov A.I., Permiakov V.A. Analysis of dispersion distortions of super wide band signals of space synthetic aperture radars for underground monitoring of decimeter wave range in Earth ionosphere (in Russian) // Idid, pp. 272-275.
- Permiakov V.A., Sorokovik D.V. Theoretical analysis of pulse radiation of linear antennas (in Russian) // Ibid, pp. 43-47.
- Permiakov V.A., Onuchin V.V. About problems of description of pulse radiation in terms of charge model of linear antenna (in Russian) // Ibid, pp. 39-42.
- Khzmalyan A.D., Kondratiev A.S. The Phase-only Shaping and Adaptive Nulling of an Amplitude Pattern // IEEE Trans. On Antennas and Propagation. 2003, Vol.51, No.2, pp 264-272.
- Sazonov D.M., Shaposhnikov S.S. Transmitting Antenna modules refusals reaction on wireless power transmission efficiency. // IEEE Aerospace Conference. March 8-15, 2003.
- Gusevski V.I. An Overview of application of the aperture orthogonal polynomials method in the development of antenna systems. // Pros. IV Internat. Conf. On Antenna Theory and Technique, 9-12 Sept. Sevastopol, Ukraine, V.1, pp. 209-212.
- Bankov S.E., Bodrov V.V., Duplenkova M.D. Equivalent circuit modeling of two-dimensional array of slots finite along one coordinate and infinite along another coordinate / R&E Journal, 2003, v. 48, № 11 (in Russian).
- Bankov S.E., Bodrov V.V., Duplenkova M.D. Two-dimensional array of slots finite along one coordinate and infinite along another coordinate / R&E Journal, 2003, v. 48, no 8 (in Russian).
- Bankov S.E. Strip line array of slots / R&E Journal, 2004, v. 49, no 5 (in Russian).
- Bankov S.E. Waveguides and waveguide elements on the base of seldom PBG crystals / R&E Journal, 2004, v. 49, no 11 (in Russian).

Patents

- Patent of Russian Federation No 2205418. Technique of protection of radars from anti-radar misiles and airplanes. Gusevsky V.I., Sazonov D.M., Pobedonoscev K.A., Nikiforov E.A. 7G01S7/38, priority from 27.03.2002.

Dissertations

- Duplenkova M.D. Research and development of two-dimensional antenna arrays of slots on the base parallel plate waveguide. Cand. Sci. (Techn) Dissertation, 2004.

Partners

- Institute of Radio Engineering and Electronics, Russian Academy of Sciences, Moscow

- Institute of Theoretical and Applied Electrodynamics, Russian Academy of Sciences, Moscow
- Special Research Bureau of Moscow Power Engineering Institute (OKB MEI), Moscow
- Moscow Institute of Physics and Technology (State University), Moscow Region
- Svetets Company, Moscow
- Institute of Electrical and Electronics Engineers, USA

IREE
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DEPARTMENT OF RADIO TECHNICAL DEVICES

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The department has on its staff
12 lecturers,
and 8 Ph.D. students

Head of Department:
Alexander I. BASKAKOV
Dr. Sci. (Tech.), Prof.

■ Main Lines of Research

Research supervisors

- **Restoration methods and algorithms of a three-dimensional surface relief with the help of interconnecting of interferometer radar with the synthesized antenna aperture and precision radar altimeter.**
  Prof. A.I. Baskakov
- **Research and development of radar-tracking systems for Earth and planets remote sensing.**
  Prof. A.I. Baskakov
- **The analysis and development of highly effective methods of radar-tracking information digital spatial–temporal processing.**
  Assoc-prof. Yu.I. Lukashenko
- **Research and development of radar-tracking systems working in the complex handicaps conditions.**
  Assoc-prof. T.S. Zhutiaeva
- **Development of modern radar-tracking complexes for earthquakes prediction and underground surface anomalies detection.**
  Assoc-prof. T.S. Zhutiaeva
- **The theory and technique of optimum digital synthesizing and processing of arbitrary radio signals**
  Assoc-prof. O.T. Matiushin
- **The theory of signals with a continuous angle modulation for discrete messages transmission systems through communication channels with band limitations.**
  Assoc-prof. O.T. Matiushin
- **Logic algebra, information and coding theory.**
  Prof. A.K. Naryshkin
- **Development of the specialized television systems and technical vision devices with microprocessor technique usage.**
  Prof. V.P. Sizov
- **Hardware-software methods of video information compression and methods of effective processing of the visual information by signal processors.**
  Prof. V.P. Sizov
- **Development of multi-channel TV tracking systems**
  Prof. V.P. Sizov

■ Agreements, Contracts, Projects Supported by State Budget

- Investigation of aerospace radar methods for Earth surface relief registration
- Fundamental research of ultra-wideband radar technology
- Double-frequency interferometry method development for estimation of surface area of water condition from small space vehicle

- Quality features analysis of radio interferometer made on the base of space radar station with the synthesized antenna aperture
- Research and development of digital system for search and demodulation of radio signals with frequency manipulation
- Processing algorithms research and development of the system for search and demodulation of radio signals with continuous angular modulation
- Key Publications

- Baskakov A.I., Permiakov V.A. etc. The radio signals distortions analysis of space radar with synthesized antenna aperture in ionosphere and troposphere (in Russian). Proc. of the Intern. Conf. «Modern radio electronics in V. Kotelnikov`s ideas retrospectives» // MPEI Publisher, 2003. P. 86.
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- Yu.I. Lukashenko, E.I. Petrakov. Potential accuracy investigation for specific measuring structures of an angular direction in digital antenna array. *Radiotechnicheskie tetradi*, No. 20, 2003, p. 45.
- A.I. Baskakov, Ka Minho. Restriction on the Bandwidth of Radio Signals of a Spaceborne Precisions Radar Altimeter Due to the Influence of the Ionosphere. IEICE TRANSACTIONS on Fundamentals of Electronics, Communications and Computer Sciences, TOKYO, vol. E87-A, NO.6. June 2004, 1318 – 1322
- Baskakov A.I., Terekhov V.A., Zhutiaeva T.S. Cross correlation analysis of microwave signals reflected from the sea surface and with the frequency offset (in Russian). Proc. of the Intern. Conf. «Informational communicational technologies». Sochi, MPEI Publisher, 2004, p.197.
- Baskakov A.I., Terekhov V.A., Zhutiaeva T.S. Double-frequency interferometry method development for estimation of water-area surface condition from the small space vehicle (in Russian). Ibid, p.212.
- Baskakov A.I., Grishekin B.Yu., Polikarpov V.S., Sakharov V.A. Operation simulation results for precision oceanographic radio altimeter of the space basing (in Russian). Proc. of the first Russian Conf. «Radio Altimeter technology – 2004». Kamensk-Uralskiy, 2004, p. 265.
- Baskakov A.I., Ka Minho. Restriction on the Bandwidth of Radio Signals of a Spaceborne Precision Radar Altimeter Due to the Influence of Ionosphere. The 2003 International Conference on Circuits/Systems, Computers and Communications, ITC-CSCC 2003, Proceedings July 7-9, 2003, Phoenix Park, Kang-Won Do, Korea. Vol.3, p. 1825.
- Baskakov A.I., Ka Minho, Terekhov V.A. An estimation of RMS inclination of sea waves on the base of reflected radio signals statistical characteristics at sea surface radiation from a plane or a space vehicle (in Russian). *Radiotechnicheskie tetradi,* No. 26, 2003, p. 23.

- Sizov V.P., Advi X.S. Analysis of n-gramm statistics in Arabian texts on different themes (in Russian). *Radiotechnicheskie tetradi,* No. 28, 2004, p. 41.
- Naryshkin A.K., Zalogin A.V. What for and how to define the syllable statistic (in Russian). *Vestnik MEI,* MPEI Publisher, No.4, 2004, p. 89.
- Naryshkin A.K. Ideal coding of independent symbols (in Russian). *Radiotechnicheskie tetradi,* No. 28, 2004, p. 59.

Partners

- Federal State Unitary Enterprise «Special Research Bureau of Moscow Power Engineering Institute», Moscow
- Federal State Unitary Enterprise «Russian R&D Institute of Space Instruments», Moscow
- Scientific Research Institute of Precision Instruments , Moscow
- Korean polytechnic university, Seoul, Republic Korea

Unique equipment

- Educational laboratory on theoretical bases of radar technique and radio navigation

RESEARCH DEPARTMENT OF GYROMAGNETIC RADIO ELECTRONICS

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The department has on its staff
15 research workers

Head of Department:
Alexander A. KITAITSEV
Cand. Sci. (Tech.), Sr. Researcher

Main Lines of Research

Research supervisors

- **Physics of magnetic phenomena, fundamental problem of gyromagnetism**
  Prof. L.K. Mikhailovsky
- **CRAM-technology at the solution of some modern radio electronics problems**
  Head of Department A.A. Kitaitsev, Sr. Researcher V.A. Konkin
- **A remote method of the magnetic hysteresis studying in local parts of the small-size lengthy products.**
  Head of Department A.A. Kitaitsev, Sr. Researcher V.F. Radchenko
- **Feasibility study of microwave and millimeter waves range identification tags development for securities and products.**
  Head of Department A.A. Kitaitsev, Leading Researcher A.E. Khanamirov
- **Studies of physical-technical properties of composite materials based on high-anisotropic ferrite and creation of microwave and MMW devices**
  Head of Department A.A. Kitaitsev, Assoc. Prof. B.P. Pollak, Leading Researcher A.E. Khanamirov
- **Frequency-selective method and creation of instruments for measuring energetic parameters of signals within microwave and MMW bands**
  Head of Department A.A. Kitaitsev
- **Development of radio-wave methods and instruments for testing and control of the technological processes**
  Lead. Researcher A.E. Khanamirov ,Sr., Researcher V.F. Radchenko
- **Investigation and development of methods and instruments for measuring the length of extended products (cables, ropes, etc.)**
  Sr. Researcher I.S. Puchkov, Sr. Researcher V.S. Puchkov
- **Solution of problems of electromagnetic ecology, protection of information and electromagnetic compatibility in microwave and MMW bands (safe usage of microwave energy, protection of computer and electronic equipment, etc.)**
  Head of Department A.A. Kitaitsev, Sr. Researcher V.A. Konkin, Jr. Researcher A.A. Shinkov
- **Development of hardware and software for fuel-gas measuring means.**
  Lead. Researcher A.V. Khrunov, Jr. Researcher V.D. Lebedev

Agreements, Contracts, Projects Supported by State Budget

- Fundamental research of alloyed ferrites microwave properties
- Hexa-ferrite thick films based on composite gyromagnetic materials — absorbents of electromagnetic radiation energy
- Improvement of the electromagnetic effects safety
- NFMR investigation of alloyed hexa-ferrites for microwave electronics
- Creation of experimental batches of hexa-ferrite valves

- Development of methods and investigation of the ultra-dispersed materials interaction with electromagnetic radiation
- Development of industrial technology of millimeter — range valves manufacturing on hexa-ferrites without external magnet
- Radiowave control system development for flue gases at thermoelectric power plants
- Investigation of electro-dynamic parameters of layered structures
- Investigation of nano-materials dielectric properties at microwave and development of method for determination of these properties
- Parameters measurements of materials samples at 2.2-50 GHz frequency range

Key Publications

- Batyshenko V.N., Kitaitsev A.A., Konkin V.A., Labkova J.I, Shinkov A.A. On a possibility of creation of gyromagnetic filters of harmonics (in Russian) // Proc. of the All-Russian Conference «Avionics-2003», Tomsk, TGU Publisher. March, 2003
- Karpov V.N., Kitaitsev A.A., Konkin V.A., Cheparin V.P, Shinkov A.A., Batyshenko V.N., Labkova J.I A gyromagnetic filter of HPL harmonics in a rectangular waveguide (in Russian) // Proc. of the 5th Intern. Conf. «Electromechanics, Electrotechnology, Electromaterial science», Crimea. Alychta, Ukraine, 15-19 september, 2003, vol.1, pp.169-172
- Eremtsova L.L.,Cheparin V.P., Serebrannikov S.V., Kitaitsev A.A., Shinkov A.A Alloyed hexagonal ferrite of M- and W- types (in Russian) // Proc/ of the 12th Intern. Conf. on spin-electronics , 19-21 December, 2003. Moscow (Firsanovka), Russia. Pp. 424-430.
- Kitaitsev A.A., Konkin V.A , Shinkov A.A., Maksaichkin V.N., Sevchenko A.V. A passive method for the protection of lengthy products with the aid of EMW fields (in Russian) // Ibid, pp. 687-691.
- Kitaitsev A.A., Shinkov A.A. A possible mechanism of losses in despersed mixtures ferrite-graphite (in Russian) // Ibid, pp. 726-729.
- Shakirzianov F.N., Kitaitsev A.A, Puchkov I.S. Electric filters with distributed parameters (in Russian) // Ibid, pp. 681-683.
- A.E. Khanamirov and others. Measuring complexes for microwacve range research (in Russian) // Ibid, pp. 636-666.
- Konkin V.A. On electric current in magnetic detector loading under ferromagnetic resonance // Ibid, Pp. 672-680.
- Kitaitsev A.A. Freguency selective energy absorbers of electromagnetic waves of MW range (in Russian) // Proc. of the Intern. Conf. «Modern radioelectronics in retrospective of V.A. Kotel'nikov's ideas». MPEI Publisher, 29-30 October, 2003, pp.25-27/
- Koledintseva M.Y., Kitaytsev A.A., Konkin V.A. Microwave Wideband Noise Spectrum Visualization and Power Parameters Measurement / IEEE International Instrumentation and Measurements Technical Conference, IMTC`2003 , Ueil, Colorado, 20-22 May 2003, pp 1228-1232.
- Dambis M.K., Kitaytsev A.A., Konkin V.A. A method for measuring a high-value dielectric constant // Scientific session of MIFI-2003. Collection of papers, vol.8, pp.59-60.
- Kitaitsev A.A Phenomenological description of magnetization precession in ferrite mono-crystals // Vestnik MEI, № 6, MPEI Publisher, 2003. Pp. 167-171.
- A.E. Khanamirov and others. On radio-wave control in a gas blow-out track of power-and-heat stations // Vestnik MEI, № 6, MPEI Publisher, 2003. Pp. 64-69.
- Kitaitsev A.A., Konkin V.A., Shinkov A.A., Batyshenko V.N., Barit N.S., Labkova J.I A gyromagnetic filter of HPL harmonics in a rectangular waveguide (in Russian) // Proc. of all-Russian Conf., Sochi.20-25 Sept. 2004, pp.116-117

- Kitaitsev A.A., Cheparin V.P., Shinkov A.A. Some electrodynamic parameters of composite medium based on dispersed shungite (in Russian). Proc. of the Intern. Conf. ICEMC-2004, Crimea. Alychta, Ukraine, 20-25 of Sept. 2004, pp. 247-249.
- Kitaitsev A.A., Konkin V.A., V.F. Radchenko. Determination of hysteresis curve band of a flat sample of dispersed magnetic material (in Russian). Ibid, pp.
- Kitaitsev A.A., Konkin V.A., Shinkov A. A CRAM technology in the solution of some problems of modern radioelectronics (in Russian) // Ibid. pp.114-116
- M. Koledintseva, A. Kitaitsev, V.Konkin, V. Radchenko. Spectrum Visualization and Measurement of Power Parameters of Microwave Wide-Band Noise. IEEE Transactions on Instrumentation and Measurement, Vol.53, NO.4, August 2004.

Partners

- «Istok»Scientific Industrial Association, Moscow
- «Domen» Research Institute, St-Petersburg
- «Fazotron» Concern, Moscow
- All-Russian Research Institute of Cable Industry, Moscow
- All-Russian Institute of Aviation Materials, Moscow
- «Moskabelmet» Plant, Moscow
- Institute of Radio Engineering and Electronics, Russian, Academy of Sciences
- Micoyan Moscow Mechanical Plant, Moscow
- Institute of Radio Engineering and Electronics, Kharkov, Ukraine
- «Metrologia»Scientific Industrial Association, Kharkov, Ukraine
- All-Russian Electrical Engineering Institute, Moscow
- All-Russian Heat Engineering Institute, Moscow
- SKB «Instruments and Systems», Ryazan
- Moscow State Engineering Physical Institute
- NII Gosznak

Unique equipment

- Frequency — selective panoramic meter of power spectral density of wideband noise signals
- High — precision meter of lengthy products
- Harmonic filters for powerful microwave radiation sources
- Ferrite resonance isolation units of MMW band
- Computerized system for measuring the occupation level in industrial tanks with the use of radar sensors

THE EDUCATIONAL-RESEARCH CENTER «MODERN RADIOELECTRONIC AND TELECOMMUNICATIONS TECHNOLOGIES»

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Number of the staff:

1 chief researcher

2 senior researchers 2 engineers

2 Ph.D. students

Basic fields of scientific researches:

- **Statistical synthesis of radio engineering systems and devices**
- **Adaptive radio systems**
- **Modern tracking systems in radio location and radio navigation**
- **Satellite radio navigation systems GLONASS, GPS**
- **Neural network methods and algorithms in radio engineering**
- **Radio electronic counteraction**
- **Modern high-speed communication systems**

Contracts

- «Development of the theory and algorithms of spatial – temporary signal processing in apparatuses of satellite radio navigation systems «
- «Feasibility study of neural networks methods usage for spatially distributed signals processing for radar-location, radio navigation and radio control systems»
- «Development of optimal combined measuring systems at non-stationary interfering influences with a priory unknown statistical characteristics»
- «Design substantiation of the small-sized antenna interference suppressor for GLONASS/GPS equipment»
- «Research and modeling of signal processing algorithms for on-board equipment of space vehicles»
- «Research on development of information processing methods and algorithms for spatially distributed systems with the purpose of air situation control»
- «Research of optimal algorithms of precision and noise immuned determination of object movement parameters in INS/GLONASS navigation systems»
- «Development of the noise immuned receiver with integrated one-stage signal processing for the GLONASS satellite navigating system»

Key publications

- Старое СтароеPerov A.I., Boldenkov E.N., Grigorenko D.A. Simplified analytical technique for calculation of potential noise immunity of optimal tracking system of satellite navigation receivers (in Russian) // Radiotekhnika, 2003, № 7, pp. 78-87.
- Perov A.I., Shatilov A.Y. The comparative characteristics analysis of two secondary joint information algorithms for in inertial/satellite navigation systems (in Russian) // Radiotekhnika, 2003, № 7, pp. 88-97.
- Perov A.I. Statistical synthesis of radio engineering systems. Radiotekhnika Publisher, 2003. 400 p.
- Perov A.I., Harisov V.N. Non-coherent reception of radio signals in the optimal filtering theory (in Russian). Radiotekhnika, 2003, № 7, pp. 52-61.
- Anikin A.L., Perov A.I. et al. Markovian optimal estimation theory in radio technology (in Russian). Edited by M.S. Yarlykov. Radiotekhnika Publisher, 2004. 504 p.

- Merculov V.I., Perov A.I. et al. Range and velocity estimation in radar systems. Part 1 (in Russian). Radiotekhnika Publisher, 2004. 312 p.
- Perov A.I. , Perov A.A. Synthesis of the phase filtering optimum algorithm for a signal with P(Y) code in a L2 frequency range for SRNS GPS (in Russian). Radiotekhnika, 2004, № 7, pp. 83-89.

Partners

- Division of Applied Problems of Russian Academy of Science
- Military Aircraft Technical University
- Special Design Bureau of MPEI
- Central Institute of Radio Electronic Systems
- «Radar-MMS» Firm
- Russian Scientific Research Institute «Space devices designing»
- Design Bureau «Navigation systems»
- Bauman Moscow State Technical University
- Corporation «FAZOTRON-SRIRD»

DEPARTMENT OF HISTORY AND CULTUROLOGY

Tel. (095) 362-74-23
The department has on its staff
18 teachers
Head of the department
Dr. Sci. (Hist), Professor Marina I. SMIRNOVA

SECTION OF HISTORY

Basic fields of scientific research

Supervisors of studies

- **An analysis of a socio-historical experience of Russia and Russian model of development in the contemporary global context.**
  Prof. Smirnova M.I., Prof. Petriakov G.V.
- **History of political parties and movements of Russia.**
  Prof. Smirnova M.I.
- **An investigation of historiographic problems of Russia at XX century.**
  Prof. Chernobaev A.A.
- **Historiography of investigations on Moscow history**
  Assoc. Prof. Dmitrieva I.A.
- **Computer technologies in education.**
  Assoc. Prof. Krasnova L.I., Assoc. Prof. Vinogradova G.Z.

Agreements, contracts, grants and state-supported themes

- Russian historiography of XX century.
- World civilizations: theory, history, culture.
- Socio-cultural sources of Stalinism. Historiography.
- A concept of a continuous education: «Studies of humanities at secondary school and technical university».
- Preparation of an multimedia electronic text-book on Russian history for the system of distance learning.

Key publications

- World civilizations of Ancient Period and Middle Ages (in Russian). Ed. By L.I. Krasnova, M.I. Smirnova. MPEI Publisher. 2003.
- Dmitrieva I.A., Smirnova M.I. A modern look on Stalinism (in Russian). MPEI Publisher. 2003.
- Dmitrieva I.A. Bogoyavlensky S.K. as a researcher in the field of Moscow history (in Russian). Istoria and istoriki. Historiographic annual. 2003, p.260-295.
- Smirnova M.I., Golubev N.P. Revolutionary events of 1917 in the estimation of socialist-revolutionists (in Russian). Vestnik MEI, 2004, № 4. P. 118-124.
- Chernobaev A.A. Russian's Historians: Biographies (in Russian). ROSPEN Publisher, 2001.

SECTION OF CULTUROLOGY

■ Basic fields of scientific research

Supervisors of studies

- **Culture of Byzantium and ancient Russia.**
  Assoc. Prof. Vinogradova G.Z.
- **Irrational in Culture.**
  Senior teacher Mikhailov A.N.
- **Typology of Culture.**
  Assoc. Prof. Ermishina N.D.
- **Russian culturology on borderline of XIX-XX centuries.**
  Assoc. Prof. Podkopaeva I.A.

■ Key publications

- *Mikhailov A.N.* Arabo-Islamic Culture (in Russian). MPEI Publisher, 2003.
- *Vinogradova G.Z., Mikhailov A.N., Podkopaeva I.A.* The World of Middle Ages: spiritual sources and cultural traditions (in Russian). Ed. by A.N. Mikhailov.(CD-ROM). MPEI Publisher, 2004.

RESEARCH CENTRE «ELECTRIC POWER PLANT»S POWER EQUIPMENT WEAR RESISTANCE INCREASE (WEAR RESISTANCE)»

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Research Centre has on its staff
14 earchers,
3 Ph.D. students

The head of the Research Centre,
Dr. Sci. (Techn), Professor
Vyacheslav A. RYZHENKOV
Corresponding Member
of Academy of Industrial Ecology

The main lines of the investigations

Research managers

- **Investigation of erosion and corrosion processes of constructional materials, development of protection methods of heat power and nuclear power plants power engineering equipment from aggressive influence of work medium and environment**

  Prof.. Ryzhenkov V.A.

- **Investigations, identification and concentration determining of surface-active agents in aqueous and technological various-purposes mediums**

  Prof., Ryzhenkov V.A.

- **Investigation of influence processes of liquid particles with the hard surface**

  Prof., Seleznev L.I.

- **Lifetime and reliability increase for power equipment in terms of the use of high-performance wear resistant coatings**

  Sr. Researcher, Kachalin G.V.

- **Energy and resource saving in heat supply systems**

  Sr. Researcher Pogorelov S.I.

- **The growth of operation efficiency of power engineering equipment on basis of prevention and removing of deposits and corrosion products from water-steam circuit surfaces**

  Leading Research Kurshakov A.V.

- **Erosion resistance tests of structural materials and protection coatings while high-speed interaction with liquids**

  Sr. Researcher Bodrov A.A.

- **Materials and protective coatings corrosion stability tests**

  Sr. Researcher Nefedkin S.I.

- **Hydrodynamic investigations of rotodynamic pumps settings, development of operational safety increase methods for power stations pump installation**

  Leading Researcher Volkov A.V.

- **Investigation and determination of operation efficiency of power plants hydraulic circuits**

  Leading Researcher Volkov A.V.

Contracts, state budget investigations

- Development of the technology and pieces of equipment of high power effectiveness to be used in private life and municipal economy
- Conception and technological foundations development of large dimension items of heat power plants heat-mechanic equipment protection while synchronous influence of different kinds of surface wear
- Determination of the application effectiveness of Moscow Powering Engineering Institute (Technical University) universal technology of increasing the operation life and heat characteristics of the plate-type heat exchangers
- Development of the process procedure of deposits removing from piping surfaces and central heat supply station equipment with corrosion protection by using surface active substances at the same time
- Investigations on determination of hot-water supply systems impurity causes in new buildings of Moscow district and proposal development on their elimination.
- Development of process procedure, working programs and quality rating of composition cleaning, anticorrosion preparation for storage and removing from storage of energy unit equipment 200 MW (№ 4, 5) and 80 MW (№ 6) of Shatura state district power plant
- Development of technical solutions of work safety increase of the turbine T-250/300-240 last stages for «Mosenergo» company
- Development of deposits removing universal technology from condenser pipe surface of multi-watt turbine of heat power plant
- Increase of operational life of turbine blade system for single-circuit nuclear power plants
- Investigation of deposits forming velocity reduction and heat-exchange surfaces corrosion protection using surface active substances of reactor on «Mayak» factory
- Development and transferring of determination methods of erosion wear of working blades of low pressure cylinder last stages of «Mosenergo» power plants

Key publications

- *About* experience of film-forming amine using for anticorrosion preparation for storage of thermotechnical equipment on thermal power plant 23 of «Mosenergo» company (in Russian) / Kurshakov A.V, Petrova T.I., Ryzhenkov V.A. et al. Teploenergetika. 2003. №9. P. 56-59.
- *Hydrodinamical* reviewer of power pumps operation as an example of buster pump valuation (in Russian). / Volkov A.V., Pankratov S.N., Pomortsev M.Yu.// Electronic journal «New in Russian electro-power-engineering. 2003. №1. P. 26-32.
- *Neutralizing* and chlorides removing from energy power station equipment due to oktadecylamine (ODA) (in Russian). / Kurshakov A.V., Ryzhenkov V.A., Zagretdinov I.Sh. Ibid. No.2. P. 14-21.
- *About* results of oktadecylamine using for deposits removing in turbine steam channel on Vladivostok thermal power plant-2 (in Russian). / Kurshakov A.V., Ryzhenkov V.A., Bodrov A.A. et. al., Ibid. No. 12. P. 47-50.
- *Corrosion* protection of surface parts of power plant thermomechanical equipment while its transportation, fitting, storage and repair (in Russian). / Ryzhenkov V.A., Kursharov A.V., Pogorelov S.I. Ibid. 2004. No. 6. P. 41-44.
- *The main* causes of pump equipment failure on power plants (in Russian). / Volkov A.V., Pankratov S.N., Pomortsev M.Yu. Ibid. No. 7. P. 39-42.

- *On a problem* of energy usage efficiency increase in housing maintenance and utilities bard (in Russian). / Ryzhenkov V.A., Pogorelov S.I., Gasho E.G., Lapshin A.V. // Energonadzor i energoeffectivnost. 2004. №1. P. 38-41.
- *Experimental* investigations of water pH value influence on power pumps cavitation characteristics / Volkov A.V., Davydov A.I.., Pomortsev M.Yu (in Russian).// Energosberezhenie i vodopodgotovka. 2004. №4. P. 44-47.

The partners

- Open joint-stock company «Astrahkanenergo», Astrahkan
- Association of West Ural power engineering specialists, Perm
- Joint-Stock Company TPD «Gidromash», Moscow
- Open joint-stock company «Dalenergo», Khabarovsk
- Baikov Institute of metallurgy and physical metallurgy of Russian Academy of Sciences
- Open joint-stock company «Kamchatskenergo», Petropavlovsk-Kamchatski
- Joint-stock company «KALUGATURBINE WORKS», Kaluga
- Open joint-stock company «Lipetskenergo», Lipetsk
- Joint-stock company METALLICHESKY ZAVOD, St. Petersburg
- Joint-stock company «Moscow committee on a science and engineering», Moscow
- Open joint-stock company «Mosenergo», Moscow
- State unitary enterprise «Mosgorteplo», Moscow
- Russian Research Institute for Nuclear Power Plant Operation (VNIIAES)
- Ministry of Science and Education of Russian Federation (Moscow)
- Ministry of housing and communal services of Moscow region Government
- State Scientific Center of Russia for machine building technology (TSNIITMASH)
- Close Joint-stock company «POMPA», Schelkovo
- «SIGMA», Lutin, Czech Republic
- Government of Moscow (Department of fuel-energy economy)
- Federal state unitary enterprise «Karpov Research physical-chemical institute»
- Joint-stock company «Electric pump unit», Schelkovo
- Russian Joint Stock Company «Unified Energy System of Russia» Moscow
- Federal state unitary enterprise Manufacturing association «Mayak», Chelyabinsk

ITC INNOVATION-TECHNOLOGY CENTER

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Nikolai D. ROGALEV
Dr. Sci. (Tech.), Professor

Companies involved in Innovation-Technology Center:

- **IVK-Sayany company**
- **Mediana-Fil'tr scientific-and-production company**
- **Mera company**
- **Neirokom company**
- **TAS company**
- **ENTEK company**
- **ESKOTEK company**
- **NPP TSIKL PLYUS company**

Main Lines of Research

Research supervisors

- **Management and organization of scientific research in higher educational establishments**

  Prof. A.V. Klimenko

- **Transfer, management, and commercialization of technologies**

  Prof. N.D. Rogalev

Agreements, Contracts, Projects Supported by State Budget

- Carrying out and approbation of Chinese companies' attraction mechanism to joint R&D projects using Russian-Chinese Technopark «Friendship» resources.
- Investigation of Chinese technological market requirements to Russian technologies and creating mechanisms of Russian-Chinese R&D projects forming and realization.
- Investigation of informational system models for supporting Russian-Chinese transfer of technical inventions and technologies.
- Development and practical application of selection, valuation, forming and accompanying mechanisms of innovational projects on the base of Russian-Chinese technopark.
- Carrying out scientific research for integrated infra-structure of technology transfer creating (in the context of Russian-Chinese cooperation)

Key Publications

- Rogalev N., Gasho E., Koval A. About results of demo zone of energetic effectiveness creating and perspectives of energy and resources saving in municipal complex of the city (in Russian). Energosberezhenie. 2003. №1.
- Rogalev N, Baydakov S. About the complex territorial approach to energetic effectiveness increasing of city's municipal economy (in Russian). Energosberezhenie. 2003. № 1.
- Rogalev N., Pavlovetc V., Lebedev I., Habalova N. The valuation of scientific and technical meaning of innovation projects (in Russian). Collected articles «Economics and commerce». 2003. № 1-2.

- Rogalev N, Pavlovetc V., Lebedev I., Habalova N. The forming of innovation complex infrastructure as a process of innovation management (in Russian). Ibid. № 3-4.
- Rogalev N., Zubkova A., Shandruk D. Carrying out the system of strategy marketing for companies in chloric field (in Russian). United scientific journal. 2003. № 22.
- Rogalev N., Binkin B., Zubkova A., Shandruk D. The evaluation of new products application projects effectiveness in chloric field taking into account risk factors (in Russian). Economics and finance. 2003. № 19.
- Rogalev N., Kurdukova G., Fedorov E., Fedorov D. Perspectives of developing of small energetic using steam turbine with back pressure on the base of private investment in Russia (in Russian). Vestnik MEI. 2003. № 5.
- Rogalev N, Challenges and Barriers of Technology Commercialization in Russia. // SYSTEMS AND POLICIES FOR THE GLOBAL LEARNING ECONOMY (PART III: Chapter 17. Edited by David V.Gibson, Chandler Stolp Pedro Conceicao, and Manuel V. Heitor // International Series on Technology Policy and Innovation. Quorum Books, Westport, Connecticut. London, 2003
- Rogalev N, Prohorov V., Kurdukova G. Khatuntceva N. The Investigation of air pollution by heat energy plant emission and auto transport emission in Moscow.

Partners

- Tekhnopark Association, Moscow
- Russian Union of Innovation-Technology Centers, Moscow
- Institute of Innovation, Creativity, and Capital, University of Texas at Austin, USA
- BADA Corporation, Harbin Institute of Technology, Harbin, People's Republic of China
- Methodology Center for Innovation Activities at Tver University, Tver, Russia
- Warwick University Science Park, Warwick, UK
- Foundation for Assistance to Small-Scale Entrepreneurship in the Sphere of Science and Technology, Moscow
- Foundation for Assistance to Innovative Activities in Higher Educational Establishments, Moscow

Unique Equipment

- Training curriculum on «Commercialization of Technologies», developed on the modular principle and including extensive text material, training video films, and texts

INNOVATION-TECHNOLOGY CENTER

IVK-SAYANY COMPANY

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IVK-Sayany has 35 persons on its staff

General Director:
Igor V. KUZNIK

Main Spheres of Activities

Scientific supervisors

- **Development and manufacture of electronic units of heat meters (heat calculators)**

  S.P. Kozlov

- **Development and manufacture of vortex-type primary flow-rate converters**

  M.Yu. Tiunov

- **Manufacture of resistive-type temperature sensors**

  V.A. Ryzhkov

- **Design, manufacture, and certification of circulation-type calibration test benches**

  I.V. Kuznik

- **Development of automatic control systems of heat consumption**

  I.V. Kuznik

- **Development of software support for the automation of heat and heat-transfer agent measurement**

  V.V. Gorbunov

Agreements, Contracts, Projects Supported by State Budget

- Agreements and contracts for the delivery of heat- and water meters and calibration equipment

Key publications

- Kuznik I.V., Briukhanov V.A. Requirements standardization to verifying charges test benches (in Russian). Zakonodanel'naya i prikladnaya metrologia. 2003. No. 6. P. 32-36.
- Briukhanov V.A. More presentations – good and different! More verifying charges text benches – good and different! (in Russian). Glavnyi metrolog. 2003. No. 6. P. 17-21.
- Kuznik I.V., Briukhanov V.A. Heat and energy metering: bottle-neck in metering unity ensuring (in Russian). Zakonodanel'naya i prikladnaya metrologia. 2003. No. 1. P. 34-38.
- Briukhanov V.A. It is a time to introduce order in the field of measurements fulfillment methods (in Russian). Glavnyi metrolog. 2004. No. 6. P. 38-42.
- Briukhanov V.A. Domestic measurement unity is in fatal danger! (In Russian). Glavnyi metrolog. 2004. No. 6. P. 50.
- Kuznik I.V. How to ensure the result according to Law? (In Russian). Zhil'io i reformy. 2004. No. 7. P. 13-16.
- Kuznik I.V. How to ensure the result according to Law? (In Russian). ZHKKH reformy. 2004. No. 5. P. 26-29.

Partners

- More than 60 dealers in most of the regions of the Russian Federation, including Western and Eastern Siberia and Far East

Unique Equipment

- Circulation-type calibration facility for inspection and calibration of water meters in the range from 15 mm to 100 mm

MEDIANA-FIL'TR SCIENTIFIC-AND-PRODUCTION COMPANY

Tel./Fax: (095) 362-7475, (095) 362-7825
E-mail: mediana@zmail.ru

The company has one Dr.Sci. and five Ph.D.on its staffs

General Director:
Alexei A. PANTELEEV
Dr. Sci. (Phys.-Math.)

Main Spheres of Activities

Scientific supervisors

- **Development of advanced integrated systems of water preparation for medicine, pharmacology, and power industry**
  Dr. Sci. (Phys.-Math.) A.A. Panteleev
- **Development of multistage systems of reverse osmosis for the preparation of extra pure water**
  Dr. Sci. (Phys.-Math.) A.A. Panteleev

Agreements, Contracts, Projects Supported by State Budget

- Development of the technology and production of reverse osmosis equipment with productivity of 150 cub.m per hour for Novocherkask TPP
- Development and bringing to the production level of integrated membrane facilities for the preparation of desalinated (distilled) water for pharmacological and medicinal applications

Partners

- Medical Center of the Central Bank of the Russian Federation, Moscow
- Dow Chemical, USA
- Moscow Power Engineering Institute (MPEI), Moscow
- R&D Center Pharmacy
- Innovatsionnoye Agentstvo (Innovation Agency), Moscow

MERA COMPANY

Tel.: (095) 362-7308, (095) 362-7042
Fax: (095) 362-7732
E-mail: info@mera-device.ru

The company has 29 persons on its staff

General Director:
Sergei S. GROKHOVSKII

Main Spheres of Activities

Scientific supervisors

- **Investigation of the dynamic characteristics of vibration-frequency force sensors involving the use of crystal piezoelectric resonators**
  Cand. Sci. (Tech.) V.V. Kashkin
- **Methods and means for checking the metrological parameters of force-sensitive piezoelectric resonators**
  Cand. Sci. (Tech.) N.I. Prokhorov
- **Development of an automatic system for simulation and design of the structural parameters of force sensors resilient elements**
  Cand. Sci. (Tech.) N.I. Prokhorov
- **Development of adaptive control algorithms in measuring systems which utilize piezoelectric-crystal sensors**
  R.I. Lushchikov

Agreements, Contracts, Projects Supported by State Budget

- Development and manufacture the equipment for MERA—ICM gas turbines balancing
- Development of digital information system for ecological monitoring of the living zone
- Development, manufacture and delivering of the crystal digital strain sensors
- Manufacture and delivery of multi-range electronic scales for wide application
- Manufacture of automatic batchers for liquid and powder components

Key publications

- Grokhovskii S.S., Prokhorov N.I. Digital strain-crystal sensors (in Russian). Praktika priborostroeniya. 2003. No. 3. P. 50-53.
- Grokhovskii S.S., Prokhorov N.I. Digital strain-crystal sensors (in Russian). Mir izmerenii. 2004. No. 9. P. 12-14.

Partners

- MMPO Salyut production association, Moscow, Russia
- AO Institut Gidroproyekt (hydroelectric power plant design institute), Moscow, Russia
- Elektropribor company, Cheboksary, Russia
- Vostok Special Design Bureau, Barnaul, Russia
- Raduga Design Bureau, Dubna, Moscow region
- Dal'elektron scientific-and-production association, Khabarovsk, Russia
- A network of more than 100 official dealers and technical service centers in Moscow and other regions of the Russian Federation

NEIROKOM COMPANY

Tel.: (095) 362-7907, (095) 362-7591, (095) 362-7853
Fax: (095) 362-7143
E-mail: dement@neuroco.orbita.ru

The company has three Dr. Sci.
and eight Ph.D. on its staff

General Director:
Vyacheslav M. SHAKHNAROVICH
Cand. Sci. (Med.), Corresponding Member
of the Russian Academy of Natural Sciences

Main Spheres of Activities

Scientific supervisors

- **Development, manufacturing preparation and manufacture of:**
- **General- and special-purpose radio telemetering equipment**

  I.S. Serdyukov
- **Safety systems and devices for railroad transport**

  Cand. Sci. (Phys.-Math.) L.A. Golchenkov, Yu.M. Meerzon
- **Special-purpose sensors and special power supplies**

  Dr. Sci. (Phys.-Math.) V.I. Mirgorodskii, V.L. Bunakov
- **Technical means of non-invasive medical and psychophysiological diagnostics**

  Cand. Sci. (Phys.-Math.) A.G. Markov, Cand. Sci. (Phys.-Math.) V.V. Bonch-Bruevich
- **Special-purpose software support**

  D.G. Fomin, Cand. Sci. (Phys.-Math.) Yu.N. Orlov
- **Systems of monitoring the physiological state of human operator and of controlling this state for the purpose of attaining the maximal operation efficiency**

  Cand. Sci. (Phys.-Math.) A.G. Markov
- **Families of special instruments with biological feedback for instruction in self-regulation and medical treatment**

  Cand. Sci. (Phys.-Math.) V.V. Dementienko

Developed at Neirokom and currently produced are:

- 115 and 115A pressure indicators (for Russian railroads)
- Safety device in the ALSN L116U system (for switching locomotives)
- Device for brake interlocking no. 267
- Stabilized voltage converter for electro-pneumatic brakes of passenger trains
- Telemechanical system of monitoring the engine driver's vigil (TSKBM)
- UPDK-MK universal psychodiagnostic complex
- Automatic system for expert assessment of the state of health of the drivers before the run
- Orbita-4MT telemetering equipment intended for testing and for maintaining standard operation of space, rocket, and aircraft equipment

Special equipment for monitoring moving objects

- The enterprise has own production areas. Skilled radio mechanics and fitters are available, as well as the most modern process equipment. The major part of equipment developed by the enterprise is manufactured in its workshops or in cooperation with other, largely conversion defense enterprises. The enterprise is licensed and all its products are certified. Appropriate inspection and acceptance of the products is provided.

ITC TAS COMPANY

Tel./Fax: (095) 362-7814, (095) 414-5765, (095) 362-7098
E-mail: info@sabaros.ru
tctas@rol.ru
Internet: www.sabaros.ru

The company has four Ph.D.
and two Sr. Researchers on its staff

General Director:
Aleksei A. KARPOV
Cand. Sci. (Tech.), Sr. Researcher

Main Spheres of Activities

- **Development of technologies for repair and reclamation of production equipment using the technologies of Sabaros S.A. (Switzerland), Metallisation Ltd (Great Britain), AMI Inc (USA)**
- **Delivery of equipment and materials for repair, reclamation, and protection of production equipment components**
- **Delivery and implementation in operation of equipment for orbital welding of tubes manufactured by AMI Inc. Company**
- **Technological assistance to enterprises in performing repairs; performance of repairs at industrial enterprises of the CIS**
- **Adjustment and start-up of equipment, training of personnel on site and in the company's training centers**
- **Major Customers of Company's Products**
- **Mining, gas production and oil production enterprises**
- **Ore dressing factories**
- **Oil refineries**
- **Metallurgical works and power plant repair enterprises**
- **Glass works**
- **Brick and ceramic-tile works**
- **Food-producing factories**
- **Basic Technological Processes Offered by the Company and the Equipment Employed in Performing These Processes**
- **Manual/semiautomatic electric-arc cutting/welding/surfacing**
- **Gas-flame cutting/surfacing/spraying (metal, ceramic, composites, polymers)**
- **Flame cutting/surfacing/spraying (metal, ceramic, composites)**
- **Electric-arc deposition (metalization) (metal, composites)**
- **Supersonic spraying (HVOF) (metal, ceramic, composites)**
- **Two-component «cold» repair polymer pastes**
- **High-temperature and low-temperature capillary soldering of unlike materials using soldering sticks and pastes**
- **Small-size apparatus for air-flame cutting of metals**
- **Small-size inverter-type welding sources for manual arc welding and for gas-shielded welding**
- **Oxyacetylene torches for soldering, surfacing, and spraying of metal, metal-ceramic, and polymer powder and wire alloys**
- **Apparatus for electric-arc deposition (metallization) of metal and composite alloys Delivery of Custom-Made Complex Systems**
- **Facilities for supersonic spraying (HVOF and HVAF processes)**
- **Facilities for hydraulic chipping-off of sprayed coatings**

ENTEK LTD.

Tel.: (095) 273-0304
Fax: (095) 362-7370
E-mail: main@entek.ru

The company has 84 persons on its staff

General Director:
Cand. Sci. (Techn)
Aleksandr B. Kozhin

Main Spheres of Activities

Scientific supervisors

- **Conducting R and D works for development high technology and preserve resource technology in the field of power.**
  Prof. A.E. Zaryankin
- **Development, modernization, manufacturing and supply onto thermoelectric power station reserve units for power equipment**
  S.V. Yakimychev
- **Realization of building and assembly jobs; assembling outside an inside engineering nets and equipment; assembling thermopower plants, compressors, pumps and fans, gas purifier equipment, manufacturing metal constructions; balancing and commissioning thermopower plants, refrigerating and compressor plants, water facilities; sewerage system and heat supply system; vibration diagnostics equipment of thermoelectric power station.**
  A.B. Kozhin
- **Development of the software packages for personal computers.**
  Cand. Sci. (Techn) S.V. Arianov

Agreements, Contracts, Projects Supported by State Budget

- Manufacturing and supply of valves with unloading and without unloading for turbines of various capacity
- Manufacture and supply of stuffing for RVP as the pack of spherical grating
- Manufacture and supply sliding shutters for fluid flow and gas for big-inch line
- Manufacture and supply dynamic power surge limiter for steam turbines of nuclear power plant
- Manufacture and supply vortical extinguishers onto steam line

Patents

- Pat. 38839. Steam heat generating turbine. A.E. Zaryankin, B.P. Simonov, Zro'chikov N.A., Arianov S.V. Registration date in the State Patents Registration Office 10.07.2004.
- Pat. 2210696. Unloading regulating valve. A.E. Zaryankin, B.P. Simonov, V.A. Zaryankin. Registration date in the State Patents Registration Office 20.08.2003.

Partners

- Department of steam and gas turbines of Moscow Power Engineering Institute (Technical University), Moscow
- Branch of TETs-22 cogeneration plant of Mosenergo utility company, Moscow
- Branch of TETs-23 cogeneration plant of Mosenergo utility company, Moscow
- Branch of TETs-26 cogeneration plant of Mosenergo utility company, Moscow
- Alstom Power steam-power plant works, Poland
- Innovatsionnoye Agentstvo (Innovation Agency) non-profit partnership, Moscow
- Mosenergomontazh company, Moscow
- SPK Mosenergostroi, Moscow

ESKOTEK COMPANY

Tel.: (095) 362-7233
Fax: (095) 362-7415
E-mail: escotech@sp.mpei.ac.ru
Internet: www.sciencepark.mpei.ru

The company has 39 persons on its staff

General Director:
Aleksandr V. KOVAL'

Main Spheres of Activities

- **Development and manufacture of electronic units of Teplokomfort (Heating Comfort) heat-consumption control systems**
- **Turn-key design, assembly, and adjustment of heat and hot-water supply metering units, warranty and service support**
- **Assembly, adjustment, and repair of power facilities, power-generating and heat-generating equipment**
- **Study into the current status of heat supply and demand in a region, development of recommendations for the choice of priorities with regard to heat saving, realization of heat-saving projects**

Agreements, Contracts, Projects Supported by State Budget

- Creation of a zone of high energy efficiency in the 10 regions of Central Administrative District of Moscow
- Development of an integrated plan for heat saving for Teploset' enterprise in Domodedovo near Moscow
- Development of regulating system for living complex heat supply at Central Administrative District of Moscow
- Development and implementation of the resources automated registration system for GKH
- Moscow Government Decree (No.77 dated 10.02.04) realization concerning creation of resources registration in Moscow.
- Development and manufacture of universal heat- and water calculator for living and administrative buildings
- Development of remote monitoring system for buildings engineering systems with the aim of GSM modems
- Development and designing of the registration and control facilities for housing and communal services

NPP CYCLE+ COMPANY

Tel.: (095) 362-7996, (095) 362-7576
E-mail: ovn@aep.mpei.ac.ru

The company has
11 persons on its staff

General Director and Scientific Supervisor:
Vadim N. OSTRIROV
Doctor of science. (Tech.), Assoc. Professor

Main Spheres of Activities

- **Development of a set of electronic converters for an electric drive utilizing modern components**
- **Research and development of controllable induction-motor and switched-reluctance electric drives**
- **Development, manufacture, warranty and service support of electronic converters for controllable induction-motor and switched-reluctance electric drives of different types**

Agreements, Contracts, Projects Supported by State Budget

- About 60 agreements for the development and delivery (including those for special purpose equipment and export) of tens of converter types for controllable electric drives of different types

Unique Equipment

- Automatic controllers for ARDN-3 proportioning pumps
- Electronic converters for five- and six-phase switched-reluctance electric drives of up to 500 kW
- Complete energy-saving equipment for pumps for urban water supply and for pumping out sewage with a capacity of up to 400 kW
- Regulating electric drive (not having the world analogues) with power up to 500 kW on the base of switched-reluctance motor with autonomous excitation

INTRON PLUS COMPANY

Phones: (095)-362-5638
(095)-362-7498, (095)-673-5102
E-mail – info@intron.ru
http://www.intron.ru

The company has
27 persons on its staff including
One Dr.Sci. (Techn) and 4 Cand,Sci. (Techn),
2 Ph.D. students
24 Dipl.-Eng.

President: Vasily V. SUKHORUKOV
Winner of Srtate Prize,
Member of Russioan Academy of Electrotechnical Sciences
Dr.Sci. (Techn), Professor

Main Spheres of Activities

- **Development of magnetic and electromagnetic methods and means for non-destructive inspection of steel ropes, tubes, rubber-rope conveyor belts, steel reservoirs and other potentially dangerous industrial objects**
- **Development of vortex-current thickness gages of galvanic coatings on dielectrics**
- **Development of technical diagnostic systems for main line tubes on the base of defects identification algorithms**

Agreements, Contracts, Projects Supported by State Budget

- Development, manufacture and and delivery of magnetic defectoscopes for non-destructive inspection of steel ropes and steel-cord belts
- Services for inspection and technical conditions testing of steel ropes, steel-cord belts ans steel reservoirs for mineral resources, oil and other industrial spheres.

Key publications

- Kotel'nikov V.S., Sukhorukov V.V. Flaw detection of steel ropes for climbing cranes subjected heat influence (in Russian). Bezopasnost truda v promyshlennosti. 2003. P. 27-31.
- Sukhorukov V.V., Kotelnikov V.S., Zhukov V.G., Khudoshin A.A. Importance of rope NDT for safe lifting of loaded cranes // OIPEEC Technical Meeting – Lenzburg – September 2003. P. 131-136.
- Volokhovsky V., Vorontsov V., Kagan A., Sukhorukov V. Stochastic assessment of steel rope strength using magnetic NTD results. Ibid, P. 137-144.
- Kotelnikov V., Sukhorukov V. Rope NTD as Means to Raise Safety of Crane and Elevator Use // 16th World Conf. on Nondestructive Testing, Montreal, Canada, August 30 – September 3, 2004. www.wcndt2004.com

Patents

- Pat. 2204129 RF. Nondesnrucnive testing method for a cross-section area and for detection of extensive ferromagnetic objects local defects and the device for its implementation. / Sukhorukov V.V., Belitskiy S.B. 2003.

Partners

- Federal Service on Technology Supervision

- RAO EES Rossii, Moscow
- Federal Net Company of EES, Moscow
- Norilsk Nikel', Norilsk
- Severstal, Cherepovets
- Magnitogorsk Metallurgy Plant, Magnitogorsk
- Uralkaliy, Berezniki
- Vorkutaugol, Vorkuta
- Kuzbassugol, Novokuznetsk
- Apatit, Kirovsk
- Sevuralboksitruda, Severoural'sk
- Krasnoyarskugol, Krasnoyarsk
- RKK Energia, Moscow
- RC-pribor, Izhevsk
- Taifun, Kaluga
- PC-Electro, Novosibirsk
- Belgorkhimprom, Minsk, Belarus
- Doskoy GOK, Khromtau, Kazakhstan
- Kaztsink, Ust'-Kamenogorsk, Kazakhstan
- Ispat Karmet, Karaganda, Kazakhstan
- Sukhaya Balka, Krivoi Rog, Ukraine
- Zaporozhckii zhelezorudnii kombinat, Zaporozh'e, Ukraine
- China Steel Corporation, Taiwan, China
- Deutsche Montan Technologie GmbH, Bochum, Germany
- Plextech Technologies PVT. Ltd., Mumbay, India
- IIS NDT Allied Services Pvt., Mumbay, India
- Tokyo Rape Mfg. Co., Ltd., Tokyo, Japan
- Klaipeda stevedoring company, Klaipeda. Lithuania
- CITS Services, Bahor, Malaysia
- Heerema Marine Contractors DV, Leiden, Netherlands
- Syncrolift, Inc., USA
- JPRB «Kolubara», Serbia and Montenergo
- Singapore Marine Technologies, Singapoore
- Eastco Limited, Hong Kong
- AT2CI, france
- CARITEC, France
- Earth Products Limited, Hong Kong
- Technical Marketing GKS AB, Sweden

CENTER OF HIGH TECHNOLOGIES
DEPARTMENT OF LOW TEMPERATURES

Tel.: (095) 362-7933, (095) 362-7556
Fax: (095) 918-1469
E-mail: NT-all@mpei.ru

The department has on its staff
11 lecturers,
28 researchers,
and 12 Ph.D. students

Scientific Head of Center,
Head of the Department:
Eugeny V. AMETISTOV
Dr. Sci. (Tech.), Professor,
Corresponding member of RAS
Director of Center:
Alexander S. DMITRIEV
Dr. Sci. (Tech.), Professor.

Main Lines of Research

Research supervisors

- **Development of systems for micro-capsulation of compressed gases, including hydrogen, into hollow mono-dispersed micro spheres**
  Prof. E.V. Ametistov, Prof. A.S. Dmitriev
- **Development of the conception, structure and an infomational-analytic system for a channel of technology transfer**
  Prof. E.V. Ametistov, Prof. A.S. Dmitriev Development of radiated droplet heat exchangers for space applications
  Prof. E.V. Ametistov, Prof. A.S. Dmitriev
- **Nano-technologies: nano-electronics and nano-energetic**
  Prof. Aleksenko A.G., prof. A.S. Dmitriev
- **Development of cryogenic corpuscular mono-dispersed targets for the atom-smasher technology and the thermonuclear fusion**
  Prof. A.S. Dmitriev, Sr. Researcher A.V. Bukharov
- **Research and development in the field of high speed ink jet printer heads**
  Prof. A.S. Dmitriev, Assoc. prof. Ginevskiy A.F.
- **Research of heat exchange and cryogenic liquids hydrodynamics in channels**
  Prof. A.V. Klimenko, Sr. Researcher A.M. Sudarchikov
- **Study in non-equilibrium transfer processes on multi-phase surfaces of gas-condensate**
  Prof. A.P. Kriukov
- **Research of currents of gas- and steam–duct mixtures in non-equilibrium conditions**
  Prof. A.P. Kriukov
- **High technologies in vacuum engineering and nano-technologies**
  Prof. S.B. Nesterov
- **Theoretical and experimental researches of thermodynamic properties of mixtures and low temperature cycles at work on cryogenic mixes**
  Assoc. Prof. A.I. Lunin, Assoc. Prof. V.I. Mogorychny
- **Research of capillary instabilities of jets and drops in non-equilibrium conditions**
  Assoc. Prof. A.F. Ginevskiy

- **The thermodynamic analysis and development of low temperature equipment**

  Prof. V.M. Brodyansky

- **Development of technology of mono-dispersed micro spheres reception from metals and alloys**

  Lead. Researcher V.B. Ankudinov

Agreements, Contracts, Projects Supported by State Budget

- Research of thermodynamic properties of cryogenic mixes
- Study of liquid jets desintegration in non-equilibrium conditions
- Experimental research of LDR hydrodynamics and heat exchange
- Research and development in the field of nano-emission electronics: nano-emitters for manufacture of ultra-bright energy saved displays.
- Development of new nanj-materials on the base of polycrystalline diamond films
- Study of non-equilibrium transfer processes on the interphase gas-condensate surface.
- Manufacturing technology for micro-spheres from rare-earth metals and alloys

Key publications

- Kryukov A.P., Levashov V.Yu., Sazhin S.S. Evaporation of diesel fuel droplets: kinetic versus hydrodynamic models // International Journal of Heat and Mass Transfer. 2004. Vol. 47. P. 2541 – 2549.
- Kryukov A.P., Levashov V.Yu., Shishkova I.N. Non-equilibrium gas over-condensation in the dusty environment (in Russian). // CD-ROM publications. Proc. of the Vth Intern. Forum on Heat and Mass transfer. Lykov ITMO Publisher. Minsk. 2004. pp.138—139.
- Kryukov A.P., Selyaninova Yu.Yu. Features of a heat and mass transfer at growth of a steam film inside the porous environment filled He II (in Russian). Ibid. P. 54—56.
- Kryukov A.P., Levashov V.Yu., Shishkova I.N. Steam current at presence of processes of evaporation-condensation on firm particles (in Russian). Prikladnaya mekhanika i tekhnicheskaya fisika. 2004. vol. 45. №3. P. 119 – 128.
- Boiarski M., Podtcherniaev O., Flynn K. Comparative Performance of Throttle Cycle CryoTiger Coolers Operating with Different Mixed Refrigerants. 13th Int. Cryocooler Conf., March 29-April 1, 2004, New Orleans, Louisiana. Paper #035.
- Application of Low Temperature Facilities for Water Vapor Pumping (in Russian). Nesterov S.B., Podtcherniaev O.N., Yudin B.V. et al. Proc. of the scient. session of Moscow Engineering Physics Institute (MIFI). 2004. Vol.4, pp.80-81.
- Cryopumps Application in Flat Panel Display and Semiconductor Production (in Russian). Podtcherniaev O., Yudin B., Androsov A. et al. Proc. of the 11th Conf. «Vacuum Science and Technology», Sudak, Ukraine, 2004, pp.110-114.
- Generation of the micro-granules containing vitamin A (retinole acetate) (in Russian). // Bukharov A.V., Skok A.E., Maksimova T.V. et al. Proc. of the XXI Research CIS Conf. «Dispersion Systems», September 20–24, 2004, Odessa, Ukraine, pp. 69–70.
- Bucharov A.V., Bliudov A.V., Skokin A.M. Experimental research of influence of viscosity on characteristics VKRS (in Russian). Ibid. p. 71–72.
- Cryogenic mono-dispersed systems // Bukharov A.V., Semenov A. A., Dmitriev A.S. et al. Ibid. P. 67–68.
- Dmitriev A.S. Hydrodynamic instability of nanojets by injection from very small nozzles / /XII NanoMeeting, San Diego, California, 23-24 May 2004.

- Dmitriev A.S. Hydrodynamic instability of electrical nanojets by injection from very small nozzles with noise EM-fields // II NASA Nano Symposium, Palo Alto, California, 3-4 October 2004.

Partners

- Association «Cholodbyt», Moscow
- Company «Heliymash», Moscow
- Company «Cryogenmash», Balashikha, Moscow region
- Keldysh Research Center, Moscow
- Institute of theoretical and experimental physics, Moscow
- Section of applied problems, RAS, Moscow
- «Kurchatov Institute», Moscow
- Design office of general engineering, Moscow
- Advards Product Department Cryogenics Inc., USA
- Technical University of Dresden, Germany
- Cryomech Inc., USA
- Dykin, Japan
- HanTek, Taiwan
- HanShin, HonKong
- Sumitomo, Japan
- APD Cryogenics Inc., USA

The unique equipment

- Equipment of the MPEI Cryogenic Center
- Thermal-box for test of the refrigerating equipment
- Installation for study of behavior He-isotopic films
- Installation for reception of cryogenic liquids drops
- Installation on reception of metal micro-spheres