

# **INSTITUTE OF POWER MACHINERY AND MECHANICS**

## **Director of the Institute**

**Pavel V. ROSLYAKOV**

**Dr. Sci. (Tech.), Prof.**

**Member of International Academy  
of Higher Schools Institutions**

**Tel.: (095) 362-7261, 362-7396, 273-3786**

**Fax: (095) 362-7428**

**E-mail: ENMIDIR@mpei.ru**

## **Departments of the Institute**

- **Department of Steam Generators Design ..... 1.2**
- **Department of Steam and Gas Turbines ..... 1.5**
- **Department of Hydromechanics and Hydraulic Machines ..... 1.8**
- **Department of Machine Dynamics and Strength ..... 1.11**
- **Department of Theoretical Mechanics ..... 1.13**
- **Department of Metals Technology ..... 1.16**
- **Department of Machine Design Fundamentals ..... 1.19**
- **Department of Engineering Drawing ..... 1.21**

Tel.: (095) 362-7600

Fax: (095) 362-7901

E-mail: PGS@mpei.ru

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

Head of Department:  
Vladimir A. DVOINISHNIKOV  
Dr. Sci. (Tech.), Prof.

### ■ Main Lines of Research

#### Research supervisors

- Development of mathematical models and application software for evaluation, validation, and technical decisions making at steam boilers designing  
Prof. V.A. Dvoinishnikov
- Development of computer-aided expertise-diagnostic systems for steam boilers and their components  
Prof. V.A. Dvoinishnikov
- Mathematical modeling of  $\text{NO}_x$ ,  $\text{SO}_x$  and PAH formation processes in power units at fuels combustion  
Prof. P.V. Roslyakov
- Development and application of highly efficient and environmentally friendly technologies for organic fuel burning  
Prof. P.V. Roslyakov, Sr. Researcher V.A. Molchanov
- Development of computer-aided technologies for power engineering equipment design  
Prof. M.A. Izyumov, Assoc. Prof. V.P. Knyazkov
- Development and application of continuous monitoring and control systems for reducing of harmful emissions into environment at thermal power stations  
Prof. P.V. Roslyakov
- Improvement of the reliability and efficiency of steam boilers at thermal power stations  
Prof. V.A. Dvoinishnikov, Sr. Researcher V.A. Molchanov

### ■ Agreements, Contracts, Projects Supported by State Budget

- Comprehensive testing and investigation of operating conditions of boiler equipment at the Dyagilevskaya co-generation power station
- Development and substantiation of technical solutions and operating regimes for improving the economic efficiency of the Ryazan district power station
- Comprehensive study for substantiation and evaluation of main process and design solution as applied to the furnace plants of a uniform line of gas-and-oil-fired boilers
- Development and investigation of functional algorithms for an information and measurement complex of the harmful emissions continuous monitoring system at the Kazan co-generation station TETs-3
- Development of a procedure for computer technologies usage in predicting harmful atmospheric emissions from a co-generation power station

- ❑ Development of the continuous monitoring type system for controlling the gaseous emissions from the heat-and-power station into the atmospheric environment
- ❑ Mathematical modeling of the PK-9 steam boiler furnace for reducing the outlet flue gas temperature by tilting the burners to the furnace bottom. Calculation of  $\text{NO}_x$  emissions
- ❑ Development a procedure and software for predicting of atmospheric  $\text{NO}_x$  emissions from stationary steam and hot water boilers fired with different fuels.
- ❑ Elaboration of guidelines for monitoring the gas composition of combustion products in stationary steam and hot water boilers
- ❑ Reduction of  $\text{NO}_x$  emissions from a BM-35RF steam boiler
- ❑ Development of a technical design assignment for a ecological monitoring system of harmful gaseous emissions and liquid effluents from thermal power stations of "TUMENENERGO"
- ❑ Development of a new technology for staged combustion with injection of nitrogen-containing additives to ensure highly efficient control of  $\text{NO}_x$  emissions
- ❑ Development and substantiation of technical solutions on a substitution boiler for a 300-MW power unit at the Ryazan district power station
- ❑ Development of an expert-diagnostic system for the furnaces of steam boilers at thermal power stations of "MOSENERGO"
- ❑ Analyzing the gaseous combustion products during operation and adjustment of boilers
- ❑ Assessment of the operation and FEED for an OP-210M steam boiler at the "Skavina" power station

## ■ Key Publications

- ❑ *Roslyakov, P.V., Egorova, L.E., Ionkin I.L., Privezentsev, D.V.,* A Study of Staged Combustion of Natural Gas and Fuel Oil (in Russian). Vestnik MEI, 2001, no. 3, p. 5.
- ❑ *Roslyakov, P.V.,* Environmentally Friendly Technologies of Solid Fuel Utilization at combustion at Thermal Power Stations (in Russian). Potentsial, 2001, no. 1, p. 37.
- ❑ *Izyumov, M.A., Soupranov, V.M., and Tugov, A.N.,* Specifics of the Thermal Design of Garbage-Fired Boilers on PCs Using the "TRAKT" Code (in Russian), in Proceedings of the International Conference on Information Means and Technologies, Moscow. Stankin Publisher, 2001, vol. 2, p. 98.
- ❑ *Tugov, A.N., Izyumov, M.A., Soupranov, V.M.,* Designs of Boilers Fired with Solid Municipal Wastes and Some Features of Their Thermal Design (in Russian), Elektricheskie Stantsii, 2002, no. 9, p. 21.
- ❑ *Popov, E.A. and Dvoinishnikov, V.A.,* Computer Technologies for Validation of Technical Solutions of Reducing of  $\text{NO}_x$  emissions from a TGMP-204 steam boiler at the Ryazan District Power Station (in Russian), in Proceedings of the International Conference on Information Means and Technologies, Moscow. "YANUS-K" Publisher, 2002, vol. 3, p. 74.
- ❑ *Galkov, V.A. and Kniazkov V.P.* Assessment of the Possibility of Using of the CFD Application Software in Designing Furnaces for Teaching Purposes (in Russian), in Proceedings of the International Conference on Information Means and Technologies, Moscow. "YANUS-K" Publisher, 2002, vol. 3, p. 82.

- *Larkov, A.V., Dvoishnikov, V.A., and Knyazkov, V.P.*, Elaboration of an Integrated Software System "FACT-Steam Boiler" on the Basis of the "TRAKT" and the "FURNACE" codes (in Russian), in Proceedings of the International Conference on Information Means and Technologies, Moscow. "YANUS-K" Publisher, 2002, vol. 3, p. 86.
- *Larkov, A.V., Dvoishnikov, V.A., and Knyazkov, V.P.*, Adaptation of the mathematical model of a steam boiler (in Russian), in Proceedings of the International Conference on Information Means and Technologies, Moscow. "YANUS-K" Publisher, 2002, vol. 3, p. 90.
- *Roslyakov, P.V., Zakirov, I.A., Ionkin, I.L., et al.*, Functioning of an Information Measurement Complex When Monitoring and Controlling for Harmful Emissions at a Thermal Power Station (in Russian), in Proceedings of the International Conference on Information Means and Technologies, Moscow. "YANUS-K" Publisher, 2002, vol. 3, p. 46.
- *Roslyakov, P.V., Ionkin, I.L., Egorova, L.E., et al.*, A Technology of Designing an Automatic System of Harmful Emission Monitoring at a Thermal Power Station (in Russian), in Proceedings of the International Conference on Information Means and Technologies, Moscow. "YANUS-K" Publisher, 2002, vol. 3, p. 50.

## ■ Dissertations

- Ionkin, I.L., Ways for Improving the Two-Stage Combustion of Natural Gas and Fuel Oil in Steam and Hot-Water Boilers, Cand.Sci. (Tech.) Dissertation, 2002.

## ■ Partners

- AO Podol'sk Engineering Works (ZiO), Podol'sk, Moscow region
- AO "Engineering Co. ZiOMAR", Podolsk, Moscow region
- Barnaul Boiler Works AO "Sibenergomash" (BKZ), Barnaul
- Belgorod Power Machinery Works (BZEM), Belgorod
- AO "TEPLOENERGOPROEKT Institute" (TEP), Moscow
- All-Russia Thermal Engineering Institute (AO VTI), Moscow
- Enterprise for Power Station Maintenance (OAO ORGRES), Moscow
- Special Design Bureau (OKB VT I), Moscow
- AO "Central Design Bureau ENERGOREMONT", Moscow
- RAO "EES Rossii", Moscow
- JSC "Mosenergo", Moscow
- AO "Ryazanenergo", Ryazan
- AO "Tyumenenergo", Surgut, Tyumen Region
- AO "Smolenskenergo", Smolensk
- AO "Nizhnovenergo", Nizhny Novgorod
- PEO "Tatenergo", Kazan

Tel./Fax: (095) 362-7675

E-mail: [pgt2@acsv.mpei.ac.ru](mailto:pgt2@acsv.mpei.ac.ru)

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

Head of Department:  
Vladimir V. GRIBIN  
Dr. Sci. (Tech.), Assoc. Prof.

### ■ Main Lines of Research

#### Research supervisors

- Development and optimization of steam-turbine installations of the new generation for super-critical steam conditions and of new efficient power units for retrofitting power engineering equipment at Russian thermal power stations  
Prof. A.D. Trukhnii, Prof. A.G. Kostyuk, Prof. B.M. Troyanovskii
- Development and optimization of combined-cycle installations with heat recovery for modernizing thermal power stations in Russia  
Prof. A.D. Trukhnii, Assoc. Prof. V.G. Gribin
- 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, Assoc. Prof. V.G. Gribin
- Development of optimal schemes and designs of self-contained small-capacity power installations  
Assoc. Prof. L.Ya. Lazarev, Assoc. Prof. V.V. Chizhov
- A Study of pipeline systems hydrodynamics of thermal and co-generation power stations and enhancing the vibration stability of these systems  
Prof. A.E. Zaryankin
- Improvement of the vibration reliability and the thermal strength and prolonging the service life of turbomachinery  
Prof. A.D. Trukhnii, Prof. A.G. Kostyuk
- Development and application of information-diagnostic system for on-line monitoring of the equipment state at thermal, co-generation, and nuclear power stations  
Prof. A.D. Trukhnii
- Elaboration of methods for dynamic design of the shaft train of turbine units considering the actual operating conditions and development of recommendation for controlling the vibrations  
Prof. A.G. Kostyuk
- 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

- Investigation of the designing and mathematical modeling tenets of new generation power machinery for advanced methods of thermal energy conversion

- ❑ Improving the efficiency and the reliability of turbomachinery
- ❑ Operation improvement of steam turbines and combined-cycle installations
- ❑ Scientific substantiation and development of technical requirements for a steam-turbine power unit with a new level of steam conditions
- ❑ Optimization of gas-turbine and steam-turbine units in designing and reconstructing aircraft gas-turbine engines for using them in power industry
- ❑ Development of methods for raising the thermal and the electric capacity and the efficiency of steam turbines at co-generation power stations in Russia
- ❑ Development and introduction of an information-diagnostic system for the low-potential section of a co-generation power station
- ❑ Analysis of the reliability of the last stage buckets 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
- ❑ Building a PC-based system for monitoring the state of power equipment of thermal, co-generation, and nuclear power stations
- ❑ Expertise of designs of steam-turbine, gas-turbine, and combined-cycle installations
- ❑ Experimental and theoretical investigations of the pressure-flow curve and the dynamics of new labyrinth seals
- ❑ Development and investigation of new exhaust hoods of large steam turbines
- ❑ Development of new control valves for steam turbines of various service
- ❑ Designing components of steam-turbine and gas-turbine units integrated in a combined-cycle unit with heat recovery

## ■ Key Publications

- ❑ *Trukhnii, A.D. and Lomakin B.V.* Cogeneration Steam Turbine and Steam-Turbine Installations (in Russian), Moscow. MPEI Publisher, 2002.
- ❑ *Turbines of Thermal and Nuclear Power Stations* (in Russian). Edited by Kostjuk, A.G. and Frolov, V.V., Moscow. MPEI Publisher, 2002.
- ❑ *Zaryankin, A.E. and Simonov, B.P.* Exhaust Hoods of Steam and Gas Turbines (in Russian). Moscow. MPEI Publisher, 2002.
- ❑ *Kasilov, V.F.* Fluid Dynamics for Thermal Power Engineers (in Russian). Handbook, Moscow. MPEI Publisher, 2001.
- ❑ *Trukhnii, A.D., Krupennikov, B.N., and Petrunin, S.V.*, Catalogue of Steam Turbine Parts (in Russian). Moscow. MPEI Publisher, 2001.
- ❑ *Sherstyuk, A.N., Trukhnii, A.D., and Frolov, V.V.* Radial-Axial Flow Turbines for Thermal Power Stations (in Russian), Thermal Engineering, 2001, no. 11, p. 899.
- ❑ *Zaryankin, A.E., Zaryankin, V.A., and Ett, V.V.* A Comparative Evaluation of Control Valves in Steam Turbines (in Russian), Thermal Engineering, 2001, no. 3, p. 225.
- ❑ *Povarov, O.A., Tomarov, G.V, and Martynova, M.V.* Geothermal Power Stations is the Way to the Environmentally Friendly Power Industry (in Russian), Izv. Akademii Prom. Ekologii, 2001, no. 3, p. 3.
- ❑ *Povarov, O.A., Tomarov, G.V., and Chertushkin, V.F.*, The Flow of Liquid Films at Elevated Density and Velocity of the Wet Steam (in Russian), Izv. RAN. Energetika, 2002, no. 3, p. 166.
- ❑ *Gribin, V.G.*, Decreasing the Losses in the Short Blades of Turbomachinery Cascades (in Russian), Thermal Engineering, 2002, no. 6, p. 462.

- *Lazarev, L.Ya., Sokolov, V.S., Fadeev, V.A., and Chizhov, V.V.* Alternatives of modernization of the Low-Pressure Cylinders of Large Steam Turbines Made by the Leningrad Metal Works (LMZ) (in Russian) // *Elektr. Stn.*, 2002, no. 9, p. 26.
- *Gribin, V.G.*, Improving the Aerodynamic Performance of the Diffuser Components in the Flow Path of Turbomachinery (in Russian) // *Tyazh. Mashinostr.*, 2001, no. 9, p. 7.
- *Kasilov, V.F.*, Designing the Flow Path of Exhaust Members of Turbomachinery (in Russian) // *Izv. RAN. Energetika*, 2002, no. 2, p. 68.
- *Semenov, V.N., Troitski, A.N., Agapov, R.N., and Retivov, M.G.* Formation Corrosive Liquids in the Flow Path of a Turbine (in Russian) // *Tyazh. Mashinostr.*, 2001, no. 8, p. 68.

## ■ Dissertations

- *Fisher, E.R.* Influence of the Form of Leading Edges and Airoils on the Efficiency of Blade Cascades, Cand. Sci. (Tech.) Dissertation, 2001.
- *Gribin, V.G.* Development of Methods for Acting on the Flow Conditions and Energy Losses in the Channels of Combined Turbine Installations, Dr. Sci. (Tech.) Dissertation, 2002.

## ■ Partners

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

## ■ Unique Equipment

- Unique experimental steam and air turbines
- Experimental centrifugal compressor driven by steam turbines and 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 vibration reliability of turbines
- Special measurement systems, which are provided for all the experimental facilities, and unique automatic experiment control systems

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

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

Head of Department:  
Vladimir I. GOLUBEV  
Cand. Sci. (Tech.), Prof.

## ■ Main Lines of Research

### Research supervisors

- Basic research in the theoretical fluid and gas dynamics and development of methods for modelling liquid and gas flows with improved description of real processes  
Prof. G.M. Morgunov
- Hydrodynamics of the streams in thin films of viscous fluid  
Prof. B.T. Emtsev
- Developing of new types of electro-hydraulic drives and their components for various applications  
Prof. V.I. Golubev
- Theoretical analysis, investigation, and development of self-contained electro-hydraulic drives  
Assoc. Prof. Yu.Yu. Zuev
- Investigation of physical effects and development of electric canned pumps with non-traditional energy conversion  
Assoc. Prof. Yu.Yu. Zuev
- Designing of hydraulic power installations having improved efficiency and reliability  
Prof. G.M. Morgunov, Assoc. Prof. B.M. Orakhelashvili
- Study of characteristics and construction of automatic logical elements based on the fluidics  
Assoc. Prof. A.I. Davydov
- Investigation of influence of the pumping equipment operation and hydraulic system components on the operation reliability of the main process cycles of a thermal power station  
Assoc. Prof. A.V. Volkov
- Development of highly reliable flowmeters for fire-and-explosion hazardous media  
Assoc. Prof. I.A. Zyubin

## ■ Agreements, Contracts, Projects Supported by State Budget

- Development of structural and parametric optimisation methods for designing new hydraulic systems
- Development of a system-innovation approach for designing hydraulic systems and equipment
- Investigation and development of electric-hydraulic control systems for high pressure axial-piston hydraulic units

- ❑ Investigation of performance of frequency-controlled displacement-type rotary pumps
- ❑ Development of a design procedure for hydraulic directional valves with a flat spool
- ❑ Design of the flow path of a turbine impeller for a small hydraulic power station
- ❑ Development of the basic tenets for creation of efficient hydraulic transmission for wind power installations
- ❑ Investigation of performance of wind power installations with variable hydraulic transmissions
- ❑ Testing of types DP and DDM dosing assembly for reliability
- ❑ Arrangement analysis of promising systems for metering and pumping liquids
- ❑ Development of methodical support for the project "Instrumental complex for investigation of hydraulic and pneumatic drives and the control systems on their basis"

## ■ Key publications

- ❑ *Morgunov, G.M., Gorban, V.M., Pankratov, S.N., and Volkov, A.V.* Numerical Solution to 3-D Direct Hydrodynamic Problem for Design and Investigation of the Vane Systems in Hydraulic Machines (in Russian), Moscow. MPEI Publisher, 2001.
- ❑ *Morgunov G.M.*, An Educational Space as a Synergetic Self-Organising System (in Russian), Proceedings of All-Russia Scientific and Methodical Meeting "Hydraulic Machines, Hydraulic Drives, and Hydropneumatics, Omsk, 2001, p. 65.
- ❑ *Golubev, V.I.*, Hydraulic Equipment of Variable Power Transmissions for Wind Power Installations (in Russian), *Privod i Upravlenie*, 2001, no. 2, p. 6.
- ❑ *Zuev, Yu.Yu., and Zyubin, I.A.* Flowmeters and Totalizers for Hazardous Media (in Russian), Collection of papers "Nauka i tehnika na rechnom transporte", 2001, no. 5, p. 28.
- ❑ *Emtsev, B.T. and Zueva, E.Yu.* Peculiarities of the Solution to a Hydrodynamic Problem on a Laminar Viscous Flow Between Rotating Coaxial Cylinders Located in the Self-Maintenance Circuit of Canned Pumps (in Russian), Collection of papers "Nauka i tehnika na rechnom transporte", 2001, no. 8, p. 25.
- ❑ *Zuev, Yu.Yu.* A Variable Electricity-Driven Submerged Canned Unit for Hydrocarbons (in Russian), Collection of papers "Nauka i tehnika na rechnom transporte", 2001, no. 8, p. 33.
- ❑ *Zuev, Yu.Yu.* Trends and the Strategy in the Development of Competitive Hydraulic Units and Hydraulic Drives for Marine Applications (in Russian), Collection of papers "Nauka i tehnika na rechnom transporte", 2001, no. 8, p. 25.
- ❑ *Orakhelashvili, B.M.*, Reconstruction of the Riverside Pumping Station of the Vladimir Cogeneration Power Station (in Russian), *Elektricheskie Stantsii*, 2001, no. 2, p. 27.
- ❑ *Golubev, V.I., and Vissarionov, V.I.*, Variable Power Transmissions for Wind Power Installations (in Russian), *Vestnik MEI*, 2002, no. 3, p.21.
- ❑ *Golubev, V.I., and Cherkasskikh, S.N.*, Mathematical Modeling of Wind Power Installation with Variable Hydraulic Transmissions (in Russian), in Proceedings of the International Conference on Information Means and Technologies. Moscow. "YANUS-K" Publisher, 2002, vol. 3, p. 58.
- ❑ *Volkov, A.V., Davydov, A.I., Pankratov, S.N., and Pomortsev, M.Yu.*, An Analysis of the Effect of Local Hydraulic Resistances of the Cavitation of Pumps (in Russian), *Energosbereszenie i Vodopodgotovka*, 2002, no. 3, p. 39.
- ❑ *Dombrovskii, V.V., Kolomeitseva, M.B., and Orakhelashvili, B.M.*, Modeling of the Hydrodynamic Processes in Small Hydraulic Power Stations (in Russian), *Elektricheskie Stantsii*, 2002, no. 2, p. 37.

## Partners

- ❑ Central Research Institute for Automatics and Hydraulics, Moscow
- ❑ Scientific and Production Association NPO «Gidromash», Moscow
- ❑ RNPO «Rosnachpribor», Moscow
- ❑ Corporation «Rossiskie nasosy» (Russian pumps), Moscow
- ❑ OAO RAO EES Rossii, Moscow
- ❑ JSC «Mosenergo», Moscow
- ❑ Firm Sigma (Czech Republic)
- ❑ Firm Festa (Germany-Austria)
- ❑ NPO Ekip, Moscow
- ❑ ZAO MAGI, Moscow
- ❑ Grundfos, (Denmark)

## Unique Equipment

- ❑ Experimental facilities for Investigation Power and Cavitation Characteristics of hydraulics turbines, reversible hydromachines and high-speed pumps
- ❑ Test stand for power and dynamic studies of hydraulic drive systems and electro-hydraulic controls for high pressure positive-displacement rotary pumps
- ❑ Experimental facility for investigation of liquid flowmeters and totalizers

Tel.: (095) 362-7700

Fax: (095) 362-8938

E-mail: ChirkovVPII@mpei.ru

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

Head of Department:  
Viktor P. CHIRKOV  
Dr. Sci. (Tech.), Prof.

### ■ Main Lines of Research

#### Research supervisors

- Mechanics of fracture and fatigue  
Member of the Russian Academy Sciences, Prof. V.V. Bolotin
- Statistical dynamics and machines and constructions safety  
Prof. V.P. Chirkov
- Dynamics and stability of structures  
Member of RAS, Prof. V.V. Bolotin

### ■ Agreements, Contracts, Projects Supported by State Budget

- Dynamic response analysis of structures to strong seismic actions
- Stability and post-critical behavior of deformed systems under essential non-conservative loads
- Damage and fracture of deformed bodies with account of environment factors
- Estimation of the reliability factors of machines and structures under static and dynamic loads
- Evaluation of the availability and the residual service life of gas mains and pressure vessels from the diagnostics results
- Dynamics of non-linear multi-body systems under impact and vibration loads

### ■ Key Publications

- *Okopnyi, Yu.A., Radin, V.P., and Chirkov V.P.*, Mechanics of Materials and Structures (in Russian), Moscow. Mashinostroenie Publisher, 2001.
- *Problems* in Reliability of Machines and Structures. Proceedings of the International Conference. Ed. by Chirkov, V.P., Belarus, Minsk, 2002.
- *Bolotin, V.V., Radin, V.P., Chirkov, V.P., and Trifonov, O.T.*, An Investigation of Resilient Plastic Deformation of Multistory Frame Building under Strong Seismic Action (in Russian), Izv. Vyssh. Uchebn. Zaveden. Stroitel'stvo, 2001, no. 5.
- *Bolotin, V.V. and Shipkov, A.A.*, Prediction of Fatigue Crack Growth with Account Taken of the Environmental Effects (in Russian), Appl. Math. and Mech., 2001, no. 12.
- *Bolotin V.V.*, Dynamic Instabilities and Post-critical Vibrations of Compliant Components Interacting with the Main Structures, International Journal of Non-Linear Mechanics, 2002, vol. 6, no. 4.

### ■ Partners

- Russian Academy of Architecture and Structural Sciences, Moscow
- Blagonravov Institute of Science of Machines, Moscow

- ▣ Russian State Corporation for Generation of Electricity and Heat at Nuclear Power stations (ROSENERGOATOM), Moscow
- ▣ State Scientific Center “Bochvar All-Russia Scientific and Research Institute of Inorganic Materials, Moscow
- ▣ DAO Central Design Office of Oil Equipment, OAO GAZPROM. Podolsk
- ▣ All-Russian Research Institute of Natural Gas and Gas Technologies. OAO GAZPROM. Moscow
- ▣ Dolezhal Research and Design Institute of Power Technology (NIIKIET). Moscow
- ▣ OAO Chekhov Power Engineering Works, Chekhov, Moscow region, Russia
- ▣ ООО «Eurosoft». Moscow
- ▣ ООО «Intron-Plus». Moscow

Tel.: (095) 362-7314

Tel./Fax: (095) 362-7719

E-mail: yurim@termech.mpei.ac.ru

The department has on its staff

15 lecturers,

1 research workers,

and 7 Ph.D. students

Head of Department:

Yurii G. MARTYNENKO

Dr. Sci. (Phys.Math.), Prof.

Honored Scientist of Russia Federation,

Member of the International Academy of High Schools Institutions,

Member of the Academy of Navigation and Motion Control

### ■ Main Lines of Research

#### Research supervisors

- Motion of mobile robots and non-holonomic electromechanical systems

Prof. Yu.G. Martynenko

- Mathematical simulation and dynamics analysis of sensors in navigation and motion control systems

Prof. Yu. G. Martynenko, Prof. V.V. Podalkov

- Mechanotronic control systems integrated with on-line computer systems

Prof. A.I. Kobrin

- Inductive method in solving problems of mathematics and mechanics (calculation and optimization of framed structures; transformation and solution of differential equations)

Prof. M.N. Kirsanov

- Computer simulation of linked bodies systems. Development of teaching and control software

Head of lab. N.V. Osadchenko

- New nano-mechanics technologies for development diamond-like silicon-carbon films and coatings

Head of lab. M.L. Shupegin

### ■ Agreements, Contracts, Projects Supported by State Budget

- Development of the mathematical support and software for the new generation of multi-sensor systems of space orientation and navigation on the basis of electrostatic gyroscopes
- Magneto-mechanical systems for astronomic orientation of a space platform
- Miniature inertial orientation and navigation systems for mobile robots
- Optimal control of the manipulators and mobile robots based on the information sent from integrated inertial navigation systems
- Design of inclinometric navigation downhole instrument of small diameter for controlling the hole space position and depth
- Comprehensive investigation of the possibility of diamond-like films usage as corrosion resistant coatings for certain parts of power installations
- Computerized workstation for developing customized software for real time systems (Modules of orientation, navigation and control of traveling objects)

## ■ Key Publications

- ❑ *Kirsanov, M.N.*, A Method of the Elastic Equivalent for Monitoring High-Order Bifurcations in Thermal Engineering Systems under Creep Conditions (in Russian), in Proceedings of the International Conference on Information Means and Technologies, Moscow. "YANUS-K" Publisher, 2002, vol. 3, p. 109.
- ❑ *Kuvykin, V.I., and Martynenko, Yu. G.*, Movement of a Conducting Solid Body in a Non-uniform Magnetic Field (in Russian), Izv. Ross. Akad. Nauk. Mekhan. Tverdogo Tela, 2002. no. 2, p. 24.
- ❑ *Martynenko, Yu.G.*, Problem of Control and Dynamics of Mobile Robots (in Russian), Novosti Iskusstvennogo Intellekta, 2002. no. 4 (52), p. 18.
- ❑ *Martynenko, Yu.G., Lenskii, A.V., and Kobrin A.I.*, Decomposition of a Problem of Control of a Mobile Single-Wheel Robot with an Unperturbed Gyro-stabilized Platform (in Russian), Doklady Akademii Nauk RF, 2002, vol. 386, no. 6, p. 1.
- ❑ *Martynenko, Yu.G. , Lenskii, A.V., and Kobrin, A.I.*, Optimization of the Acceleration Process for a "Gyrowheel" Robot, in Mobile Robots and Mechatronic Systems (in Russian), Moscow, MGU Publisher, 2002, p. 164.
- ❑ *Martynenko, Yu.G. and Gusev, D.M.*, A Method of Vibration Acceleration of a Wheel Robot, in Mobile Robots and Mechatronic Systems (in Russian). Moscow, MGU Publisher, 2002, p. 14.
- ❑ *Podalkov, V.V., Aleksandrov, A.M., and Donnik, A.S.*, Natural Oscillations of a Two-Link Robot – Manipulator (in Russian), Vestnik MEI, 2002, no. 1, p. 12.
- ❑ *Martynenko, Yu.G., Kobrin, A.I., and Lensky, A.V.*, Stabilization of Single-Wheeled Mobile Robot with an Unperturbed Platform, Proceedings of the International Colloquium on Autonomous and Mobile Systems. Magdeburg, Germany. Fraunhofer IRB Verlag. June. 2002, p. 78.
- ❑ *Martynenko, Yu.G., Kobrin, A.I., and Lensky, A.V.*, Stability and Control of Autonomous Motion of Gyrowheel. Mathematical Simulation and Experimental Results. Proceedings of the 12-th International Symposium on Measurement and Control in Robotics. Bourges-France. ENSI. June. 2002.
- ❑ *Martynenko, Yu.G. and Siregar, H.P.*, Optimization of Power Consumption of Anthropomorphic Robots Driven by an Electromotor, Proceedings of III International Workshop on Robot Motion and Control RoMoCo'02. Poznan University of Technology, November 9-11. 2002. Bukowy Dworek, Poland. P. 113.

## ■ Dissertations

- ❑ *Gladyshevskii, M.N.*, Methods and Algorithms of Orientation of a Space Vehicle Using an Astronomic System, Cand. Sci. (Tech.) Dissertation, 2002.

## ■ Partners

- ❑ State Unitary Enterprise "Moscow Experimental Design Office "MARS", Moscow
- ❑ "Aviapribor", Moscow
- ❑ Federal Scientific and Production Center OAO "Ramenskoye Priborostroitel'noe Byuro", Ramenskoe, Moscow region.
- ❑ Federal Scientific Center "TsNIElectropribor", St. Petersburg
- ❑ Velizi Technological University, Paris, France
- ❑ Hydrodynamics Institute of the Tokhoku University, Japan
- ❑ Tsinghua University, Beijing, China
- ❑ University of Enschede, Netherlands

## ■ Unique Equipment

- ▣ Equipment for thin diamond-like film deposition
- ▣ Mobile robot prototypes made according to the Schedule of the International Scientific and Technical Festivals "Mobile robots – 1999, 2000"
- ▣ Handle for displaying efforts during computer modeling (virtual reality)
- ▣ Software package "Universal Mechanism" for modeling the dynamics of complex linked bodies
- ▣ Gimballess attitude-and-heading reference system for investigating the regimes of initial alignment and navigation
- ▣ Experimental setup for investigating dynamics and accuracy characteristics of a dynamically tuned gyroscope
- ▣ Experimental facility for investigating fiber optic gyroscope
- ▣ Experimental facility for investigating the processes of information transmission and reception in multiprocessor and multi-problems real-time systems

Tel.: (095) 362-7568, 362-7118

Fax: (095) 362-8938

E-mail: techmet@bl14sInt.mpei.ac.ru

The department has on its staff

15 lecturers,

4 research workers,

7 Ph.D. and 1 Dr.Sc. students

Head of Department:  
Vyacheslav M. MATYUNIN  
Dr. Sci. (Tech.), Prof.

### ■ Main Lines of Research

#### Research supervisors

- Development of methods for quick diagnostics of the metal in industrial equipment for its structural and mechanical characteristics

Prof. V.M. Matyunin
- Design of automated instruments for non-destructive monitoring of metals physical and mechanical properties

Prof. V.M. Matyunin
- Development of an electron-beam technology for local processing of surfaces

Head of lab. A.S. Khokhlovsky
- Development of equipment and technology for simultaneous double-side electron-beam and arc welding

Assoc. Prof. V.K. Dragunov
- Development of a complex of precision electron-beam welding technologies for heterogeneous materials

Assoc. Prof. V.K. Dragunov
- Electron-beam welding technologies for thin-walled members from refractory metals and alloys in poli- and mono-crystal state

Assoc. Prof. V.V. Novokreshchenov
- Development of precision technologies of diffusion welding for unique joints

Assoc. Prof. V.V. Novokreshchenov
- Development of equipment and technology for automatic single-pass arc welding of thick metals

Assoc. Prof V.O. Bushma, Assoc. Prof. V.M. Borovik
- Development and improvement of the rolling technology and calibration of tools for the production of hot-rolled pipes

Prof. R.M. Golubchik
- Monitoring and control of the electron-beam welding

Prof. V.N. Lastovirya
- Synergetic approach to analyzing the strength of material at macro-, mezo- and micro-levels accounting for the velocity factor

Prof. I.P. Spirikhin

### ■ Agreements, Contracts, Projects Supported by State Budget

- Investigation of magnetic and mechanical properties of steels

- ❑ Development of new technologies for manufacturing and restoration of combined structures from dissimilar materials made by electron-beam welding
- ❑ Development and application of a method of simultaneous double-side electron-beam and arc welding of steels and alloys
- ❑ Development of methods and design of portable devices for quick determination of metal properties directly in metal articles
- ❑ Development of precision technologies of assembly, welding, and inspection of combined diaphragms of steam turbines
- ❑ Development of a technology for electron-beam welding of heat exchangers and manufacturing of a pilot lot of the articles
- ❑ Study of regularities in the processes of arc welding of structural members for vehicles
- ❑ New ways for improving industrial production for hot-rolled pipes from alloy steels

## ■ Key publications

- ❑ *Matyunin, V.M., Spirikhin, I.P., et al.*, Materials Science and Metal Technology (in Russian), Moscow. Vysshaya Shkola Publisher, 2002.
- ❑ *Matyunin, V.M., and Volkov P.V.*, Determination of Mechanical Properties and Adhesion Strength of Ion-Plasma Deposited Coatings Using the a Sclerometric Method (in Russian), Metalloved. i Termich. Obr. Metallov, 2002, no. 3, p. 236.
- ❑ *Spirikhin, I.P.*, The Physical Tenets of the Nature of the Material Strength (in Russian), Prikl. Fizika, 2001, no. 2, p. 85.
- ❑ *Matyunin, V.M., Khokhlovsky, A.S., and Dragunov, V.K.*, Developments of the Department of Process Metallurgy of MPEI on the Electron-beam Technology and Non-Destructive Examination for Metal Properties (in Russian), Tyazh. Mashinostr., 2001, no. 8, p. 18.
- ❑ *Bushma, V.O.*, A Stationary Strip Electrode for Arc Welding, Welding International, 2001, no. 48(2), p. 3.
- ❑ *Vigdorovich, V.N., and Karimbekov, M.A.*, Methods of Alloying of Film Materials and Structures for Thermoelectric Converters (in Russian), Prikl. Fizika, 2002, no. 2, p. 83.

## ■ Dissertations

- ❑ *Lastovirya, V.N.*, Improving the Stability of Electron-beam Welding on the Basis of On-Line Control of the Beam Parameters and Identification of the Shape of the Vapor-Gas Channels, Dr.Sci. (Tech.) Dissertation, 2002.
- ❑ *Merkulov, D.V.*, Processes of Broaching of Blanks Having Different Initial Plasticity and the Optimal Distribution of Cyclic Form Changing Parameters Along the Length of a Deformation Zone, Cand. Science (Tech.) Dissertation, 2002.

## ■ Partners

- ❑ Bauman Moscow State Technical University (MGTU)
- ❑ Scientific and Production Association OAO "NPO Energomash", Khimki, Moscow region
- ❑ OAO MKB "Fakel", Khimki, Moscow region
- ❑ High Technical School, Konstanz, Germany
- ❑ Paton Institute of Electrical Welding, Kiev, Ukraine
- ❑ Technical University, Budapest, Hungary
- ❑ Physico-technical Institute, Minsk, Republic Belarus

- ❑ Blagonravov Institute of Science of Machines, Russian Academy of Sciences, Moscow
- ❑ State Center "Research-and-Production Association on Mechanical Engineering technology" (NPO TsNIITMASH), Moscow
- ❑ AO "Aeroelectric", Moscow

### ■ **Unique Equipment**

- ❑ Electron-beam installation "Langeven" for welding metal with 45 kW power
- ❑ Multipurpose tester "Instron" for mechanical tests of materials with numerical control
- ❑ Stationary and portable devices for quick on-line non-destructive determination of physical and mechanical properties of structural materials
- ❑ Equipment for the automatic single-pass arc welding of thick metals
- ❑ Plant SVDU-26M for diffusion welding

Tel.: (095) 362-7638  
 Fax: (095) 362-7525  
 E-mail: OKM-all@mpei.ru

The department has on its staff  
 12 lecturers,  
 1 research workers

Head of Department:  
 Vasilii P. NIKOLAEV  
 Dr. Sci. (Tech.), Prof.

### ■ Main Lines of Research

#### Research supervisors

- Designing of parts and assemblies for special services 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 metering unit for loose materials feeding
- Improvement of the quality of critical articles from dissimilar materials
- Development of methods for taking the account of the interaction among different types of damages under starting, shutdown, and steady state operating conditions
- Development of technical proposals on the reduction of damages to materials of high-temperature rotors of steam turbines

### ■ Key Publications

- *Kudryavtsev, E.P.*, Guidelines for Calculation of Short-Circuit Currents and Selection of Electrical Equipment (in Russian), Ed. by B.N.Neklepaev. Moscow. NTs ENAS Publisher, 2001.
- *Korzh, D.D.*, Engineering Design Practice (in Russian). Methodical Guidelines, Moscow. MPEI Publisher, 2001.

- ▣ *Korzh, D.D.*, The Dependence of the Evaluation of the Temperature Cyclic Damage to Parts on the Deformation Characteristics of a Material (in Russian), Vestnik MEI, 2001, no. 5, p. 60.
- ▣ *Pichugin, V.S., Nikolaev, V.P., and Nikolaev, S.G.* The Fatigue Strength of Composite Materials with a Cross-Linked Structure (in Russian), Vestnik MEI, 2002, no. 3, p. 5.

## ■ Partners

- ▣ OAO RAO EES Rossii (Unified Power System of Russia) company, Moscow
- ▣ Engineering Center for Strength 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 Tsentri MNTP), Moscow

## ■ Unique equipment

- ▣ Facility for testing of shafts with a cross-linked structure for torsion
- ▣ Tools for testing specimens from composite materials

Tel.: (095) 362-7219

Fax: (095) 273-3786

E-mail:

The department has on its staff  
35 lecturers

Head of Department:  
Alexandr O. GORNOV  
Cand. Sci. (Tech.), Prof.

### ■ Main Lines of Research

#### Research supervisors

- Construction of electronic data bases for drawings of machine constructing and electro-technical components  
Prof. A.O. Gornov
- Development of teaching methods in engineering drawing basing on natural cognitive logic  
Prof. A.O. Gornov
- Development of academic textbook for the course "Engineering Drawing" for the open education system  
Prof. A.O. Gornov

### ■ Key Publications

- *Gornov, A.O. and Gordeeva, I.V.*, Computer Technology and the Content of the Discipline "Engineering Graphics" (in Russian), in Proceedings of the All-Russian Meeting "Improving Graphical and Geometrical Training of Students in the Current Situation", Rostov-on-Don, 2002, p. 169.
- *Gornov, A.O.*, On the Structure of Teaching Courses for the Remote Education (in Russian), in Proceedings of the International Conference on Information Means and Technologies, Moscow. "YANUS-K" Publisher, 2002, vol. 1, p. 165.
- *Radionova, L.K.*, The effect of the CAD-Technologies usage on the Course "Engineering Graphics" (in Russian), in Proceedings of the International Conference on Information Means and Technologies. Moscow: "YANUS-K" Publisher, 2002, vol. 1, p. 169.
- *Kaurkin, V.N. and Stepanov, Yu.V.*, Three-Dimensional Models of Computer Graphics Usage in Studying Electrical equipment of Thermal Power stations, in Proceedings of the International Conference on Information Means and Technologies, Moscow. "YANUS-K" Publisher, 2002, vol. 1, p. 172.
- *Gubarev, A.Yu.*, A Conventional Classification of Dimensions in Drawings of Details (in Russian), in Proceedings of the International Conference on Information Means and Technologies, Moscow. "YANUS-K" Publisher, 2002, vol. 1, p. 177.
- *Rodin, A.B.*, Teaching the Engineering Graphics Discipline at Schools (in Russian), in Proceedings of the International Conference on Information Means and Technologies, Moscow. "YANUS-K" Publisher, 2002, vol. 1, p. 182.

# **INSTITUTE OF THERMAL POWER ENGINEERING AND TECHNICAL PHYSICS**

## **Director of the Institute**

**Viktor V. MAKHROV**  
**Dr. Sci. (Tech.), Prof.**  
**Honoured Worker of Higher Institutions**  
**of Russian Federation**

**Tel./Fax: (095) 362-7205**

**Tel./Fax: (095) 273-3481**

**E-mail: ITTFDIR-all@mpei.ru**

## **Departments of the Institute**

- **Department of Water and Fuel Technology ..... 2.2**
- **Department of Thermal Power Stations ..... 2.6**
- **Department of Automated Control Systems  
for Thermal Processes ..... 2.12**
- **Department of Thermal Engineering Fundamentals  
named after M.P. Vukalovich ..... 2.16**
- **Department of Boiler Plants and  
Power Engineering Ecology ..... 2.20**
- **Department of Nuclear Power Stations ..... 2.24**
- **Department of Engineering Thermophysics ..... 2.27**
- **Department of General Physics and Nuclear Fusion ..... 2.31**

Tel.: (095) 362-7608

Fax: (095) 362-7171

E-mail: Voronov@welfer.mpei.ac.ru

The department has on its staff

13 lecturers,

18 research workers,

and 8 Ph.D. students

Head of Department:

Viktor N. VORONOV

Dr. Sci. (Tech.), Prof.

Member of the Russian Academy of Natural Sciences,

Member of the International Academy of High School,

Honored Power Engineer of the Russian Federation

## ■ Main Lines of Research

### Research supervisors

- Water-chemistry regimes at thermal and nuclear power stations  
Prof. T.I. Petrova
- Water treatment at thermal power stations and treatment of highly mineralized waste water  
Lead. Researcher L.G. Vasina
- Monitoring and automatic systems of chemical testing at thermal and nuclear power stations; mathematical modeling of water-chemistry processes  
Prof. V.N. Voronov
- Problems in fuel treatment and preparation  
Prof. B.S. Belosel'skii
- Development of automated computer-based simulators for training the personnel of chemical shops at thermal and nuclear power stations  
Assoc. Prof. V.F. Ochkov

## ■ Agreements, Contracts, Projects Supported by State Budget

- Generalization of the experience on the water-chemistry processes optimization and development of recommendations on improving the reliability and the efficiency
- Analysis of water impurities and deposits on heat transfer surfaces of hot-water boilers
- Generalization of experimental and industrial data on organic inhibitors of salt deposits for developing recommendations on their application in heat exchangers
- Improving the reliability and the efficiency of thermal power stations equipment by removing deposits and corrosion products from the surfaces in water-steam paths
- Development and implementation of the water correction treatment in a district heating network for corrosion velocity decreasing of construction materials and decreasing the amount of waste waters
- Development a system for monitoring the medium corrosive activity using computer techniques taking into account the organic compounds thermolysis
- Information services, analysis of equipment at thermal power stations and development of the principles for improving the equipment reliability
- Development of a simulator for water chemistries controlling at thermal and nuclear power stations

- ❑ Creation of the PC software for acquiring and analyzing the raw data at the workstation of a Chemical Department Head
- ❑ Optimization of chemical-engineering processes at thermal and nuclear power stations for developing a technology minimizing the amount of waste waters
- ❑ Experimental investigation of the liquid film contamination on turbine blades with corrosive impurities in the course of steam expansion in a turbine
- ❑ Effect of organic compounds in the steam-water path on the reliability of co-generation power station equipment
- ❑ Elaboration of power equipment preservation procedures and removing deposits from heat transfer surfaces
- ❑ Experimental investigation of the influence of water chemistries and thermal-physical parameters on deposit formation in boilers
- ❑ Development of a procedure for optimization of the water chemistry and the water treatment for environmentally friendly thermal power stations operating on solid fuel
- ❑ Development algorithms for the first revision of the basic design of the control system for the primary and the secondary circuits as applied to power unit III at the Kalininskaya nuclear power station
- ❑ Construction of electronic databases for acquiring and application of the researches results for freely accessible software packages and educational simulators
- ❑ Elaboration of a conception and software support for teaching complexes and educational simulators in a distributed electronic educational system

## ■ Key Publications

- ❑ *Voronov, V.N. and Petrova, T.I.*, Problems in Organizing the Water-Chemistry of Thermal Power Stations (in Russian), Thermal Engineering, 2002, Vol. 95, no. 7, p. 525.
- ❑ *Voronov, V.N., Nazarenko, P.N., and Pauli, E.V.*, Specifics Using the Water Chemistry Monitoring Systems under Neutral-Oxygen Treatment Conditions (in Russian), Vestnik MEI, No. 5, 2001.
- ❑ *Voronov, V.N., Nazarenko, P.N., Nikitina, I.S., et al.*, A Unique Test Facility for Monitoring of the Water Chemistry Conditions at a Thermal Power Station and the Possibility of Remote Access to It (in Russian), Vestnik MEI, 2002, no. 5, p. 115.
- ❑ *Dooly, R.B., Povarov, O.A., Petrova, T.I., et al.*, Turbine Steam Chemistry and Corrosion, TR-1006283, EPRI, Palo Alto, USA, 2001.
- ❑ *Petrova, T.I., Ryzhenkov, V.A., Levin, V.A., et al.*, Improving the Efficiency and the Reliability of Thermal Power Equipment at Thermal Power Stations by Improving the Quality of Water and Steam (in Russian), Elektricheskie stantsii, 2001, no. 11, p. 56.
- ❑ *Povarov, O.A., Petrova, T.I., Semenov, V.N.*, Investigation of Electrochemical Properties of Liquid Films Formed in the Phase Transition Zone on Turbine Stages, Proc. VI Int. Conf. on Water Chemistry at Thermal Power Stations, USA, June 27-29, 2000, - 1001363, EPRI, Palo Alto, CA, USA, 2001, □. 15.1-15.14.
- ❑ *RD 153-34.1-37.532.4-2001*: General Specification for Process Chemical Monitoring of the Water Chemistries at Thermal Power Stations, 2001
- ❑ *Ochkov, V.F. and Solodov, A.P.*, Mathcad/Differential Models, MPEI Publishers, 2002 [in Russian].
- ❑ *Ochkov, V.F., Pil'shchikov, A.P., and Chudova, Yu.V.*, Open Calculations in Thermal Engineering by an Example of Water Treatment (in Russian), Energo-sberegenie i Vodopodgotovka, 2002, no. 1, p. 21.

- *Kopylov, A.S., Kondakova, G.Yu, Orlov, K.A. et al.*, Using Comprehensive Simulators in Training and Organizing Competitions between Employees of Chemical Shops (in Russian), *Energoberegenie i Vodopodgotovka*, 2002, no. 4., p. 19.
- *Kopylov, A.S., Kaplina, V.Ya., Ochkov, V.F., et al.*, An Automated Procedure of Emergency Trainings in Case of a Failure in the Water Chemistry of Unit Power Stations (in Russian), *Vestnik MEI*, 2002, no. 2, p. 22.
- *Povarov O.A., Petrova T.I., Semenov V.N., Kashinsky V.I., Troitsky A.N., Petrov A.Yu., Dooley R.B.*, Study of the Electrochemical Properties of Liquid Films Formed on Turbine Stages in the Phase Transition Region: Experimental Turbine Tests. *PowerStation Chemistry*, 2002, vol. 4, no. 1, p. 5.
- *McLure I.A., Petrov A.Yu., Gordon D.H., Ball M., and Dooley R.B.* Interfacial Behavior at Above-Ambient Temperatures of Ionic and non-Ionic Aqueous Solutions Important in Boiler Water Chemical Conditioning, *PowerStation Chemistry*, 2002, vol. 4, no. 3, p. 139.
- *Petrov A.Yu., Xiao C., Palmer D.A., King D.W.* Chemiluminescence Method for the Determination of Sub-mg kg<sup>-1</sup> Copper Concentrations. *PowerStation Chemistry*, 2002, vol. 4, no. 4, p. 293.
- *Boglovskii, A.V.*, An Experience in the Introduction of the Phosphate Treatment of Heat Supply Network Water (in Russian), *Inf. Bull. Gosenergonadzora Minenergo Rossii, Teplosnabzhenie*, 2002, no. 3 – 4, p. 10.
- *Men'shikova, V.L., Lainer, Yu.A., Surova, L.M., et al.*, The Efficiency of Water Coagulation Treatment using Mixed Coagulating Agents (in Russian). Abstracts of Papers, V Int. Congress and Technical Exhibition "Water: Ecology and Processes", *EKVATEK-2002*, June 4-7, 2002, Moscow.
- *Dobrokhoto, V.I., Ryzhenkov, V.A., Kurshakov, A.V., et al.*, The Effectiveness of Techniques for Removing Deposits, Sanitation, and Protection of the Surfaces of the Steam-and-Water Paths in the Equipment at Thermal Power Stations against Corrosion (in Russian), *Thermal Engineering*, 2002, no. 1, p. 41.

## ■ Dissertations

- *Petrova, T.I.*, A Theoretical Analysis and Working out of Recommendations for the Thermal Power Stations Water Chemistry Optimization, Dr. Sci. (Tech.) Dissertation, 2001
- *Gashenko V. A.*, The Effects Water Chemistry and Metal Corrosion in Improving the Reliability and Safety of Water-Cooled Nuclear Steam Generating Installations, Dr. Sci. (Tech.) Dissertation, 2001.
- *Vidoikovich, S.*, Investigation of the Sulfate Behavior in the Water-and-Steam Paths of Thermal Power Stations, Cand. Sci. (Tech.) Dissertation, 2001.

## ■ Partners

- JSC «Mosenergo», Moscow
- All-Russian Research Institute of Nuclear Power Engineering (VNIIAM), Moscow
- All-Russia Thermal Engineering Institute (OAO VTI), Moscow
- Electrical Power Research Institute (EPRI), Palo-Alto, CA, USA
- Oak Ridge National laboratory, Oak Ridge, TN, USA
- OAO Kaluga Turbine Works (KTZ), Kaluga
- Far-Eastern State Technical University (DGTU), Vladivostok
- Russian Scientific Center "The Kurchatov Institute", Moscow
- Enterprise for Power Station Maintenance (OAO ORGRES), Moscow

- ❑ Cogeneration Power Stations TETs-21, 22, 23, 25, 28 of JSC «Mosenergo», Moscow
- ❑ Novomoskovsk District Power Station, OAO «Tulenergo», Novomoskovsk
- ❑ Aleksin Cogeneration Power Station, Aleksin
- ❑ Pervomaiskaya Cogeneration Power Station, Pervomaisk
- ❑ OAO «Tver'energo»
- ❑ NPO Central Boiler-Turbine Institute (TsKTI), Saint-Petersburg
- ❑ All-Russian Institute for Nuclear Plant Research (VNIIAES), Moscow
- ❑ State Unitary Enterprise Karpov Physic-chemical Institute (GUP HIFTI), Moscow
- ❑ State Unitary Enterprises Dolezhal' Research and Construction Institute for Power Installations (GUP NIKIET), Moscow
- ❑ Elektrogorsk Research Center for Safety of Nuclear Power Stations (ENITs VNIIAES), Elektrogorsk, Moscow region

## ■ Unique Equipment

- ❑ Analyzers for the determination of micro-concentrations of impurities in water:
  - Ion chromatograph «Dionex», USA;
  - Atomic-absorption spectrometer «AAS-2», Germany;
  - Low-level Na-meter «Orion», USA
- ❑ The test desks for study of the corrosion rate for construction materials in the water and steam under actual parameters of encountered power equipment
- ❑ Test facility simulating a chemical monitoring system

Tel.: (095) 362-7157

E-mail: valery@hps.mpei.ac.ru

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

Head of Department:  
Anatolii S. SEDLOV  
Dr. Sci. (Tech.), Prof.

## ■ Main Lines of Research

### Research supervisors

- Low-waste technologies of water and effluents treatment using a thermal-chemical demineralization method  
Prof. A.S. Sedlov
- Development of arrangements and equipment for thermal water treatment  
Prof. A.S. Sedlov
- Development of energy and resource saving technologies for thermal power Stations  
Prof. A.S. Sedlov
- Development and optimization of schemes and parameters of gas-turbine and combined-cycle thermal power stations  
Assoc. Prof. V.D. Burov
- Investigations of investments economical efficiency at thermal power stations design  
Assoc. Prof. V.D. Burov
- Optimization of schemes, characteristics, and type of equipment for thermal and nuclear power stations  
Prof. S.G. Tishin
- Optimization of thermal power stations regimes  
Assoc. Prof. E.T. Il'in
- Development of automatic control method of the working conditions of equipment at Thermal Power Stations  
Assoc. Prof. E.V. Dorokhov

## ■ Agreements, Contracts, Projects Supported by State Budget

- Investigation of methods for increasing the thermal efficiency of the Ingush gas-turbine power station
- Development of a combined-cycle power stations on the basic of an "Alstom" gas-turbine unit and investigation of its efficiency under Russia conditions
- Operating conditions influence of gas-turbine and steam-gas installations at thermal power stations on activities of the thermal efficiency of "Mosenergo" plant
- Development and investigation of combined-cycle installations with a parallel arrangement for the "Mosenergo" condetions
- Investigation of calculation methods for thermal schemes, performance, and efficiency of combined-cycle cogeneration power stations
- Revision of the design documentation on phase 4 of expansion of the Saransk cogen-eration power station 2

- ❑ Balancing and commissioning on the evaporation installation at the North-West cogeneration power station.
- ❑ Development of low-waste water treatment technology with standardization of technical solutions.
- ❑ Development of detailed technical proposals on the re-equipment of the cogeneration power station of the Moscow Power Engineering Institute on the basis of combined-cycle technology with optimizing solutions on the station arrangement.
- ❑ Estimation of the possibility and the efficiency of improving 200 and 300-MW power units using advanced automatic process control systems made by Siemens Co.
- ❑ Development of technical and commercial offer for increasing the electrical capacity of gas-turbine co-generation power station in Krasnodar
- ❑ Development and investigation of thermal schemes of gas-turbine co-generation power stations on the basis of aircraft gas-turbine units of small and medium capacity.
- ❑ Development and optimization of the thermal arrangement of the Meretoyakhinskaya gas-turbine thermal power station
- ❑ Investigation of operating conditions and power characteristics, and of ways for improving the environmental safety of operation and promising equipment for thermal power stations of "Mosenergo".
- ❑ Designing of a gas turbine and a combined-cycle unit for operating conditions at the Tyumen' co-generation power station.
- ❑ Selection of main process solutions and performance evaluation of a 10-MW gas-turbine co-generation power station.
- ❑ Investigation of different methods of the make-up water treatment for boilers at thermal power stations and development of guidelines on water demineralization with controlled environmental impact
- ❑ Development of technical proposals on procedures for water treatment at large-capacity combined-cycle installations and comparing the alternatives on the basis of their process and environmental performance.
- ❑ Efficiency analysis of evaporators and steam converters at thermal power stations of RAO "EES Rossii" and program development for their re-equipment and prolonging their service life.
- ❑ Investigation, development and application of a method for reducing water consumption and water losses at co-generation power stations TETs-8 of "Mosenergo" on the basis of evaporation installation modernization.
- ❑ Investigation of heat and mass transfer, development of a design method and technical proposals on the contact heat exchanger as applied to the MES-60 combined-cycle installation.
- ❑ Analysis of alternatives and ways of solving the problem of the thermal power stations of "Mosenergo" conversion from the city water to the water from the Moskva River, and solution a problem of sludge waters
- ❑ Development of a pilot technology of the make-up water treatment in a heating network on the basis of H-Na-cation polishing using effluents from the demineralization plant.
- ❑ Investigation and development of technical measures for reducing water consumption and waste water discharge at co-generation power station TETs-23 of "Mosenergo", and evaluation of their economical and environmental characteristics.
- ❑ Analysis, investigation, and development of proposals for reducing the water consumption and the amount of effluents at the Volgodonsk co-generation power station TETs-2.

- ❑ Improving the efficiency of re-carbonization of blow-down water of the evaporator; development of recommendations for the evaporation installation of phase IV of the upgrading of the Saransk co-generation power station TETs-2 and for co-generation power stations with thermal water treatment.
- ❑ Investigations of conditions of formation, collection, dehydration, and disposal of gypsum sludge at a pilot installation when treating the waste water from Saransk co-generation power station TETs-2. Preparation of guidelines on using unified technical solutions at other co-generation power stations.
- ❑ Review and elaboration of technical documents on the application of a hydrogen-sodium cation treatment procedure on the basis of the UPCORE process for phase IV of the Saransk co-generation power station TETs-2 construction.
- ❑ Designing an evaporator and a power unit evaporation installation for district heating c-co-generation power stations in the network water heating system.
- ❑ Development of methods of radioactive wastes collecting and utilization and techniques for controlling their formation in facilities for treatment of the make-up water for heat supply network.
- ❑ Investigation of the water chemistry of a heating network and development of a procedure for the correction treatment of the network water at the co-generation power station TETS-1 of the Kotlas Paper Mill to reduce the amount of salts discharged into the river of Vychegda.
- ❑ Bench tests of ways for decreasing the formation of radioactive waste and waste water within in treating the make-up water for the district heating network
- ❑ Investigation and elaboration of a technology for distributing loads and delivery of heat from turbine installations of a co-generation power stations during transition periods and seasons without a heating load.
- ❑ Development of a procedure, an algorithm, and a computer code for processing the data obtained in routine testing of PT-60-130 and T-100-130 turbine installations and an analysis of the state of the turbines and the regenerative heating system.
- ❑ Development of methods of investigation and optimization of the structure and performance of combined-cycle units with parallel arrangement operating on steam having sub-critical parameters.

## ■ Key publications

- ❑ *Sedlov, A.S., Shishenko, V.V., Il'ina, I.P., et al.*, The Commercial Operation and Unification of the Low-Waste Technology of Thermochemical Softening and Demineralization of Water (in Russian), Thermal Engineering, 2001, no. 8, p. 635.
- ❑ *Shishenko, V.V., and Moiseitsev, Yu.V.*, Ways for Reducing Water Consumption and Waste Discharge at Thermal Power Stations (in Russian), Thermal Engineering, 2001, no. 10, p. 866.
- ❑ *Sedlov A.S., Shishenko V.V., Potapkina E.N., et al.*, The Low-Waste Technology of Thermochemical Treatment of Water and Waste Water at Water Treatment Plants for the Rostov Environmentally Friendly District Power Station with 300-MW Power Units (in Russian), Vestnik MEI, 2001, no. 5, p. 80.
- ❑ *Tsanev, S.V., Burov, V.D., and Sokolova, M.A.*, Investigation of the Thermal Efficiency of Coal-Fired Combined-Cycle Thermal Power Stations with a Parallel Arrangement (in Russian), Proceedings of Russian National Symposium on Power Engineering, Kazan, 2001, vol. 1, p.47.
- ❑ *Sedlov, A.S., Shishenko, V.V., Zhidkikh, V.F., and Potapkina E.N.*, The Power Technological Complex as a Base for Developing an Environmentally Friendly Thermal Power Station (in Russian), Proceedings of Russian National Symposium on Power Engineering, Kazan, 2001, vol. 1, p. 51.

- *Il'in, E.T. and Pechenkin, S.P.*, Extension of the Range of Electrical Load Variation for a T-100-130 Turbine Installation when It Operates on the Basis of the Heat Demand Curve (in Russian), *Vestnik MEI*, 2001, no. 1, p. 50.
- *Lavygin, V.M., Tishin, S.G., and Dorokhov, E.V.* Development of the Methodical Provisions for Making Support Calculation in the Course of Operation of a Turbine Installation at a Thermal Power Station (in Russian), *Vestnik MEI*, 2001, no. 1, p. 56.
- *Burov, V.D., Tsanev, S.V., Torzhkov, V.E., and Zenzin A.V.*, The Efficiency of Re-equipment Using a Combined-Cycle Technology (in Russian), *Energoberezhenie i Vodopodgotovka*, 2001, no.1, □. 4.
- *Burov, V.D., Tsanev, S.V., Kopsov A.Ya, et al.*, A Procedure for Determining the Power Performance of a Combined-Cycle Thermal Power Station with Parallel Circuits (in Russian), *Izv. RAN. Energetika*, 2001, no. 2, p. 113.
- *Tsanev, S.V., Burov, V.D., and Sokolova, M.A.* Regenerative Heating of the Cycle Air of Gas-Turbine Installations in the Schemes of Combined-Cycle Units at Thermal Power Stations (in Russian), *Energoberezhenie i vodopodgotovka*, 2001, no.2, p. 30.
- *Tsanev, S.V., Burov, V.D., and Zauer, A.* An Analysis of the Operating Conditions of Combined-Cycle Cogeneration Power Stations (in Russian), *Izv. RAN. Energetika*, 2001, no. 4, p. 132.
- *Burov, V.D., Tsanev, S.V., Makarevich, V.V., et al.*, Specifics in Determining the Auxiliary Power Consumption by Gas-Turbine and Combined-Cycle Installations of Thermal Power Stations, *Vestnik MEI*, 2001, no. 4, □. 5.
- *Tsanev, S.V., Burov V.D., and Zauer, A.*, Improving the Efficiency of Thermal Power Stations (in Russian), *Elektricheskie Stantsii*, 2001, no. 12, p. 2.
- *Abramov, A.I., Elizarov, D.P., Sedlov, A.S.*, Improving the Environmental Safety of Thermal Power Stations (in Russian), Moscow, MPEI Publisher, 2002.
- *Burov, V.D., Tsanev, S.V., Torzhkov, V.E., and Zenzin, A.V.*, Investigation and Optimization of the Initial Steam Conditions of Combined-Cycle Units at Condensation Power Stations with Single-Pressure Heat-Recovery Steam Generators (in Russian), *Energoberezhenie i Vodopodgotovka*, 2002, no. 2.
- *Burov, V.D., Tsanev, S.V., Sokolova, M.A., and Yakupov, Sh.R.*, The Specific in Determining and Analyzing the Performance of a Power Module as a Part of a Combined-Cycle Installation (in Russian), *Vestnik MEI*, 2002, no. 4, p. 16.
- *Burov, V.D., Tsanev, S.V., and Torzhkov, V.E.* Investigation of the Effect of Fuel After-Burning at a Combined-Cycle Units of Condensation Power Stations with Single-Pressure Heat-Recovery Steam Generators (in Russian), *Proceedings of XLIX Scientific and Technical Session of the Russian Academy of Sciences on Gas Turbine Problems*, Moscow, VTI Publisher, 2002, p. 64.
- *Burov, V.D., Tsanev, S.V., and Dudolin A.A.* The Effect of the Electricity-to-Heat Ratio on the Performance of Combined-Cycle Co-Generation Power Units (in Russian), *Proceedings of III Russian Scientific and Engineering Conference "Improving the Efficiency of Thermal Power Equipment"*, Ivanovo, Ivanovo State Power University Publisher, 2002, p. 56.
- *Burov, V.D., Tsanev, S.V., Sokolova, M.A., and Voronin V.P.*, The Efficiency of Technologies for Utilization of Fuel in the Power Industry of Russia (in Russian), *Proceedings of Ist Nizhne-Volzhsкая Scientific and Practical Conference "Energy Saving and Energy Supply on the Basis of Renewable Energy Sources and Non-Traditional Technologies"*. Volzhskiy Branch of MPEI (TU), 2002, p. 45.
- *Sedlov, A.S., Zhidkikh, V.F., and Shkondin, Yu.A.*, Optimizing the Design of Evaporators of Thermal Water Treatment Plants (in Russian), *Proceedings of III Russian Scientific and Engineering Conference "Improving the Efficiency of Thermal Power Equipment"*, Ivanovo, Ivanovo State Power University Publisher, 2002, p. 25.

- *Remezov, A.N., Khramchikhin, A.M., Sedlov, A.S. et al.*, Environmental Control Problems of Water Clarification and Sludge Recovery at the Cogeneration Stations of Mosenergo (in Russian), Thermal Engineering, 2002, no. 2, p. 89.
- *Sedlov, A.S., Shischenko, V.V., and Sidorova, S.V.*, Technology of Scaling Prevention under Thermal Desalination of Water, Proceedings of the 15-th International Conference on Efficiency, Costs, Optimization, Simulation, and Environmental Impact of Energy Systems, Germany, Berlin, July 3-5, 2002, p. 1561.

## ■ Dissertations

- *Moiseitsev, Yu.V.*, Reduction in Water Consumption and Water Discharge for Water Treatment Systems and Waste Water Processing Systems at Thermal Power Stations. Cand. Sci. (Tech.) Dissertation, 2001.
- *Yushkov, B.V.* Development of an Air-Cooled Condenser of the New Generation and Investigation of Its Performance, Cand. Sci. (Tech.) Dissertation, 2001.
- *Gusev, V.V.*, Scientific Substantiation, Development and Implementation of a New Regulatory and Methodical Base and a Monitoring System as Applied to Especially Hazardous Power Plants, Cand. Sci. (Tech.) Dissertation, 2002.
- *Polivanov, V.I.*, Substantiation and Development of Advanced Programs for Ensuring the Survivability of Thermal Power Stations with 160-300-MW Power Units, Cand. Sci. (Tech.) Dissertation, 2002.

## ■ Partners

- JSC "Mosenergo", Moscow
- District Power Stations GRES-3 and GRES-24, Cogeneration Power Stations TETs-8, 11, 21, 22, 23, 25, 26, and 28 of JSC Mosenergo, Moscow
- OAO RAO EES Rossii (Unified Power System of Russia) company, Moscow
- Shtutgart University, Germany
- PEO "Tatenergo", Kazan
- OAO "Mordovenergo", Saransk
- OAO "Smolenskenergo", Smolensk
- OAO "Lipetskenenergo", Lipetsk
- OAO "Siemens", Moscow
- Institute Mosenrgoproekt, Moscow
- ZAO "MR-Energo", Moscow
- ZAO "MR-Energo-Stroy", Moscow
- AO Podol'sk Engineering Works (ZiO), Podol'sk, Moscow region
- All-Russia Thermal Engineering Institute (AOOT VTI), Moscow
- Technical University, Berlin, Germany
- AOZT "Logrus" St.-Petersburg
- AK "Eurocontract", Moscow
- ZAO Industrial and Financial Group "AviaRus-21", Moscow
- OOO "Alstom", Moscow
- OAO "Company EMK-Engineering", Moscow
- OAO "NPO Saturn", Rybinsk
- Institute of High Temperatures Scientific Association, Russian Academy of Sciences (IVTAN), Moscow

- ❑ State Unitary Enterprises Research and Production Association (FGUP NPP) “Motor”, Ufa
- ❑ AOZT “NPO VNIIEF-Volgogas”, Sarov
- ❑ OAO Kaluga Turbine Works (KTZ), Kaluga
- ❑ OAO Taganrog Boiler Works (TKZ) “Krasnyi Kotel’shchik”, Taganrog
- ❑ International Union of Machine Manufacturers, Moscow
- ❑ Konakovo District Power Station, Konakovo
- ❑ Enterprise for Power Station Maintenance (OAO “Firm ORGRES”), Moscow

Tel.: (095) 362-7029

Fax: (095) 362 77 20, (095) 362-3481

E-mail: ASUTP-all@mpei.ru

The department has on its staff  
24 lecturers,  
11 research workers,  
and 20 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 metrological characteristics investigation, calculation, and 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, and of the process control system of a power stations problems to be considered in 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
- Fundamentals development for advanced computer simulators creation for operation staff of power stations  
Prof. E.K. Arakelyan, Assoc. Prof. N.D. Kuznetsov, 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.F. Kuzishin, 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  
Sr. 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

## ■ **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
- Software for automation of the regulators tuning 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 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.

## ■ **Key Publications**

- *Ivanova, G.M., and Kuznetsov, N.D.*, Thermal Engineering Measurements, in Theoretical Fundamentals of Thermal Engineering. Reference Book (in Russian), Moscow, MPEI Publisher, 2000.
- *Rotach, V.Ya.*, An Expert Estimate of Control Algorithms Using Methods of Fuzzy Logic and Probability Theory (A Synthesis of Fuzzy Regulators without Application of the Fuzzy Logic Theory) Zittau Fuzzy Colloquium, September 2001, Germany.
- *Rotach, V.Ya., Zver'kov, V.P., and Kuzishchin, V.F.*, An Adaptive System of Automatic Level Control in the Low-Pressure Heaters of the Nuclear Power Stations Power Units, Thermal Engineering, 2001, no. 7.
- *Arakelyan, E.K., Sarkisyan, R.E., and Mezin, S.V.*, Optimization of the Process Control System Reliability Characteristics Based on the Concept of Hierarchy Analysis, Thermal Engineering, 2001, no. 10, p. 795.
- *Makarch'yan, V.A., Panov, V.A., and Dong TsE*, The Expert and Diagnostics System for Estimation the Metal State of a Boiler Superheater, Thermal Engineering, 2001, no. 10, p. 816.
- *Pletnev, G.P.*, Simulation Methods for Distributed Process Control Systems for Power Units at Thermal Power Stations, Thermal Engineering, 2001, no. 10, p. 842.
- *Andryushin, A.V.*, Fundamentals for Developing an Automated Control System for Repair Work Making, Thermal Engineering, 2001, no. 10, p. 846.
- *Arakelyan, E.K., Marakach'yan, V.A., Tazhiev, E.I., and Samarenko, E.I.*, Turbines Maneuverability Increasing at Cogeneration Power Stations to Cover the Dips in the Electricity Demand, Thermal Engineering, 2001, no. 4, p. 296.

- *Arakelyan, E.K., Pan'ko, M.A., and Mezin, S.V.*, Some Aspects of Using the Fuzzy Theory for Solving Optimisation Problems on Power Plants, Zittau Fuzzy Colloquium, September 2001, Germany.
- *Arakelyan, E.K., and Mukhin, V.S.*, A Situation Approach to the Diagnostics of Power Equipment at Cogeneration Power Stations, Vestnik MEI, no. 3, 2001.
- *Andryushin, A.V.*, Improving the Management of Repair Work on Power Equipment, Vestnik MEI, no. 3, 2001.
- *Kuznetsov, N.D., Okhotin, N.D., and Kuzishchin, V.F.*, Software Package Usage for Training of the Instrumentation Departments Personnel at Thermal Power Stations in Professional Skill Competitions, Elektricheskie Stantsii, 2001, no. 2.
- *Ivanova, G.M., Yachina, S.P., Degterev, V.N., and Lisin, A.P.*, Heat Meters in a System for Heat Accounting Supplied from a Cogeneration Station, Thermal Engineering, 2002, no. 1, p. 37.
- *Rotach, V.Ya.*, An Expert Estimate of Control Algorithms Using of Fuzzy Logic Methods and Probability Theory, Thermal Engineering, 2002, no. 4, p. 315.
- *Rotach, V.Ya.*, An Analysis of Control Algorithms in Cascade Systems, Thermal Engineering, 2002, no. 10, p. 817.
- *Pan'ko, M.□.*, To Calculation of Linear Systems with Time Delays on the base of Extended Frequency Responses of the Controlled Object, Thermal Engineering. 2002, no. 10, p. 823.
- *Usenko, V.V.*, Some Aspects of Optimal Tuning Control Systems with PID Algorithms. Proc. of X Fuzzy Colloquium, Zittau, Germany, 2002.
- *Arakelyan, E.K. and Pan'ko, □.□.*, □bout Application of Fuzzy Description in Optimisation Tasks on Power Plants, Proc. of X Fuzzy Colloquium, Zittau, Germany, 2002.
- *Volgin, V.V. and Savin, A.V.*, An Accuracy in Zeroes Estimation of the Gaussian Random Processes Specific for Thermal Process Control Systems, Vestnik MEI, no. 1, 2002.
- *Andryushin, A.V., Andryushin, D.A., and Kudryavyi, V.V.*, Ways for Investments Attracting in the Power Industry of Russia, Vestnik MEI, no. 2, 2002.
- *Arakelyan, E.K., Khoa, L.K., and Man, N.V.*, Optimization of the Thermal Power Station Mode Using Economic and Ecological Criteria, Vestnik MEI, 2002, no. 4.
- *Arakelyan, E.K., Sarkisyan, R.E., Mezin, S.V., and Kurtov, O.I.*, Integrated Technologies and Intelligent Knowledge Retrieving Means for Decision Supporting Systems at Cogeneration and Nuclear Power Stations Control Actions. Vestnik MEI, 2002, no. 5.

## ■ Dissertations

- *Dronov, V.A.*, Automated Tuning of Complex Control Systems of Power Plants Using Indirect Optimality Criteria. Cand. Sc. (Tech.) Dissertation, 2002.
- *Grishin, K.A.*, Automatic Control Systems Synthesis for Power Industry Plants at Non Authentic Information on Their Mathematical Models. Cand. Sc. (Tech.) Dissertation, 2002.
- *Andryushin, A.V.* Organization and Management Improving for Equipment Maintenance and Repairs System Thermal Power Stations, Dr. Sc. (Tech.) Dissertation, 2002.

## ■ Partners

- Institute of Technical Processes, Automation, and Process Measurements of the Applied Sciences University, Zittau, Germany
- SIEMENS, Germany

- ❑ North-Chinese Electrical Power Engineering Institute, China
- ❑ National University of Cheju, South Korea
- ❑ SAS Institute Co., USA
- ❑ JSC Mosenergo, Moscow
- ❑ OAO RAO EES Rossii (Unified Power System of Russia) company, Moscow
- ❑ Cogeneration Power Stations TETs-27 and TETs-25 of JSC Mosenergo, Moscow
- ❑ Surgut District Power Station GRES-2, Surgut
- ❑ Research and Production Association NPTEplopribor, Moscow
- ❑ Research Institute for Environmental Problems of Power Engineering (NII EPE), Rostov-on-Don
- ❑ Central Research Institute for Comprehensive Automation (TsNIIKA), Moscow
- ❑ Elektrogorsk Research Center for Safety of Nuclear Power Stations (ENITs VNII AES), Elektrogorsk, Moscow region
- ❑ Institute Mosenergoproekt of Mosenergo, Moscow

Tel.: (095) 362-7760, (095) 273-4889

E-mail: TOT-all@mpei.ru

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

Head of Department:  
Nikolai Ya. FILATOV  
Cand. Sci. (Tech.), Assoc. Prof.

## ■ Main Lines of Research

### Research supervisors

- Comprehensive investigation of thermal-physical properties of ozone friendly working mediums for heat pumps and refrigeration installations of the new generation

Prof. A.A. Alexandrov, Prof. V.V. Altunin, Assoc. Prof. V.F. Utenkov
- Investigation of thermal-physical properties of water, steam and water solutions for thermal power engineering

Prof. A.A. Alexandrov
- Investigation and characteristics optimization of thermal power stations using exergy and entropy methods

Assoc. Prof. N.Ya. Filatov
- Comprehensive analysis of physical properties of high-temperature superconducting substances

Assoc. Prof. N.Ya. Filatov
- Development of highly efficient heat exchanging systems

Assoc. Prof. V.A. Pronin
- Enhancement of convective heat exchange in components of power installations

Assoc. Prof. V. I. Velichko
- Development of computer models for designing and diagnostics of condensation facilities

Prof. A.P. Solodov
- Thermodynamic cycles analysis of gas-steam units

Prof. V.S. Okhotin
- Renewable energy sources

Prof. B.I. Kazandzhan, Assoc. Prof. E.V. Ezhov
- Numerical simulation of heat and mass transfer in items of power equipment

Assoc. Prof. D.V. Sidenkov
- Development of thermal-physical fundamentals for super-critical technologies usage for purification of contaminated substances in thermal power installations

Prof. V.V. Altunin, Assoc. Prof. A.A. Sukhikh, Assoc. Prof. N.Ya. Filatov

## ■ Agreements, Contracts, Projects Supported by State Budget

- Investigation of PVT-data and data on the saturation curve for fluorine ether and its binary mixtures in vapor state

- ❑ Experimental and theoretical investigation of thermal-physical properties of working mediums and heat carriers in thermal power stations and refrigeration plants
- ❑ Preparation of an analytical report about the current state and prospects of renewable energy sources utilization in the European Union countries
- ❑ Theoretical and experimental methods of investigation of thermal-physical properties of working mediums, heat carriers, and materials
- ❑ Basic states equations for technically important substances in liquid and gaseous phases including the critical region
- ❑ Pilot studies for creation of autonomous energy sources on the basis of catalytic oxidation of hydrocarbon fuels
- ❑ Development of a design procedure and technical proposals on contact heat transfer in a combined-cycle units
- ❑ Creation of a test facility for investigation of super-critical pressure cycles of thermal transformers and heat-and-mass transfer processes in apparatuses of a heat pump installation
- ❑ Development of methods for solving of the radiation transfer equation for the Green functions of a diffused light field

## ■ Key Publications

- ❑ *Gerasimov, O.O., Kuznetsov, M.A., and Grigor'ev, B.A.*, New Generalized Equations for Calculating the Heat Capacity at Constant Pressure on the Saturation Curve (in Russian), *High Temperature*, 2001, vol. 39, no. 3, p. 460.
- ❑ *Barabanov, Yu.A., Bagdanov, O.I., Dement'ev, Yu.A., et al.*, Calculating the Stability of Lighting Protection Ropes of Overhead Transmission Lines (in Russian), *Elektricheskie stantsii*, 2001, no. 8, pp. 32 - 37
- ❑ *Solodov, A.P.*, Heat Transfer in the Vicinity of the Front Stagnation Point of a Tube being transverse streamlined (in Russian), *Thermal Engineering*, 2001, no. 3, p. 75.
- ❑ *Kostanovskii, A.V., and Kostanovskaya, M.E.*, On Possibility for Improving the Perfection Level of the Absolutely Black Body Model (in Russian), *High Temperature*, 2001, vol. 39, no. 2.
- ❑ *Konstanovskii, A.V., Zeodinov, M.G., and Kostanovskaya, M.E.*, Experimental determination of the Isotropic Graphite Emissivity at Temperatures above 2300 K (in Russian), *High Temperature*, 2001, vol. 39, no. 1.
- ❑ *Zhilyakov, L.A. and Kostanovskii, A.V.*, Transfer of the Thermoelectric Emission Current in a Dielectric Channel in Crossed Electric Fields (in Russian), *High Temperature*, 2001, vol. 39, no. 5
- ❑ *Solodov, A.P.*, A Dynamic Model of a System with Heat Release (in Russian), *Vestnik MEI*, 2001. no. 1, p. 43.
- ❑ *Kobzev, G.A., Fokin, L.R., Aleksandrov, A.A., et al.*, Electronic Handbook on Properties of Substances for Power Engineering (in Russian), Kazan, KGEU Publisher, 2001, vol. 3, p. 159.
- ❑ *Serebryannikov, S.V., Filatov, N.Ya., Nikanorov, V.A., et al.*, Thermal-physical Properties of Alloyed Hexaferrites of Type  $\text{M}_2\text{Fe}_{16}\text{O}_{23}$  (in Russian), *Proceedings of the IV International Conference on Physical and Technical Properties of Electrical Materials and Components*, September 2001, Russia, Moscow, MPEI Publisher, 2001, p. 161.
- ❑ *Pronin, V.A., Tsoi, A.D., Klevtsov, A.A., et al.*, An Air-Cooled Water-Jet Condenser of a Steam-Turbine Installation (in Russian), *Jubilee Scientific and Engineering Conf., ANTOK, SNG*, 2001, p. 253.
- ❑ *Pronin, V.A., Klevtsov, A.A., and Prokhorov, M.I.*, Heat Transfer in Staggered-Divergent and Convergent Bundles with the Small Number of Rows of Finned Tubes

(in Russian), Proceedings of Scientific and Engineering Conference "Problems in Energy Saving. Heat and mass transfer in electrical and torch furnaces and fire-chambers", Tver, 2001, p. 15.

- ❑ *Carvajal Mariscal and Pronin V.A.* "Experimental Study of a Bank of Finned Pipes with Inclined Fins", Proc. of V World Conference on Experimental Heat Transfer, Fluid Mechanics, and Thermodynamics, Thessaloniki, Greece, Sept. 24-28, 2001, p. 847.
- ❑ *Solodov, A.P.*, Gravity Bubble Flows (in Russian), Thermal Engineering, 2002. no. 8, p. 675.
- ❑ *Okhotin, V.S.*, The Effect of the Air Compression Process Parameters on the Thermodynamic Cycle Efficiency of a Combined-Cycle Unit with a Heat-Recovery Steam Generator (in Russian), Vestnik MEI, 2002, no. 2, p. 5.
- ❑ *Sukhikh, I.I., Altunin, V.V., and Zakopyrin, M.A.*, Experimental Investigation of Thermodynamic Properties of the SF<sub>6</sub> – Perfluoropropane Binary Mixture (in Russian), Vestnik MEI, 2002, no. 2, p. 86.
- ❑ *Kazandzhan, B.I., Solodov, B.I., and Takaev, A.P.*, An Air Solar Collector with Transparent Capillary Insulation (in Russian), Vestnik MEI, 2002, no. 3, p. 49.
- ❑ *Umanchik, N.P., Umanchik, N.N., Semenido, B.E., et al.*, Experimental Investigation of Local Thermal and Aerodynamic Characteristics of the Sections in Air-Cooled Heat Exchangers with Improved Power Performance (in Russian), Khimicheskoe i Neftegazovoe Mashinostroenie, 2002, no. 5, p. 6.
- ❑ *Altunin, V.V.*, The Phase Relationships and the State Equations for Azeotropic Mixtures of Izobutane with Fluoroethanes, Fluoropropanes, Fluoroethers (in Russian), Proceedings of International Scientific and Engineering Conference "Hydrocarbons as Refrigerants", Kholodil'naya Tekhnika, no. 7, p. 8.
- ❑ *Carvajal-Mariscal, Florencio Sanches-Silva, Nunez Alfaro, E.A., Pronin, V.A.*, Compact Heat Exchanger Using Pipes with Inclined Fins, Proceedings of the International Symposium on Compact Heat Exchangers, August 2002, Grenoble, France, Editions ETS, 2002, p. 323.
- ❑ *Kostanovski, A.V., Kostanovskaya, M.E., and Zeodinov, M.G.*, Experimental Determination of Emissivity of Isotropic Graphite in the Region of Temperatures of 3000-3600 K, XVI European Conference on Thermophysical Properties, September 1-4, 2002, London, England.
- ❑ *Kostanovski A.V. and Kostanovskaya, M.E.*, The Investigation of the First-Order Phase Transition of the High Temperature Material by the Thin Plate Method, VIII International Temperatures Symposium, October 21 – 24, Chicago, USA, 2002

## ■ Partners

- ❑ Institute of Experimental Mineralogy, Russian Academy of Sciences, Chernogolovka, Moscow region
- ❑ Institute of Solid State Physics, Russian Academy of Sciences, Chernogolovka, Moscow region
- ❑ Ministry of Fuel and Energy of the Russian Federation, Moscow
- ❑ JSC "Gasprom", Moscow
- ❑ OAO RAO EES Rossii (Unified Power System of Russia) company, Moscow
- ❑ State Scientific Center 3 Bochvar All-Russia Research Institute of Inorganic Materials named after Acad. A.A. Bochvar<sup>3</sup> (Bochvar VNIINM), Moscow
- ❑ All-Russia Research Institute of Machine Building for Oil Industry (VNIINEFTEMash), Moscow
- ❑ Kazan State Technological University, Kazan
- ❑ State Academy for Refrigeration and Foodstuff Process Technologies, St.-Peterburg

- ❑ All-Russia Research Center of Standardization, Informatization, and Certification of Feedstock, Materials, and Substances, Moscow
- ❑ All-Russian Research Institute for Natural Gases and Gas Technologies (VNIIGas), Razvilka, Moscow region
- ❑ AO Podol'sk Engineering Works (ZiO), Podol'sk, Moscow region

## ■ **Unique Equipment**

- ❑ Precision experimental installations for investigation of the liquid –vapor equilibrium and the volumetric relationships for mixtures of low-boiling substances
- ❑ Precision experimental installations for investigation of heat capacity and thermal and electric conductivity of high –temperature superconducting materials
- ❑ State-of-the Art Test Setup for Cleaning of Contaminated Mediums Using Supercritical Pressure Technologies
- ❑ Experimental and educational test facility «Heat pump TH-300»

Tel.: (095) 362-7734, (095) 273-5468

E-mail: [ProkhorovVB@mpei.ru](mailto:ProkhorovVB@mpei.ru)

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

Head of Department:

Eduard P. VOLKOV,

Dr. Sci. (Tech.), Professor,

Corresponding member of the Russian Academy of Sciences

## ■ Main Lines 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<sub>x</sub> 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. Researcher 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 a heat power 2-MW 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  $\text{NO}_x$  emissions to the atmosphere
- ❑ Development and application of a low  $\text{NO}_x$  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  $\text{NO}_x$  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

## Key publications

- *Pashkov, L.T.*, Mathematical models of Processes in Steam Boilers (in Russian). Inst. komp'yuternykh issled., Moscow – Izhevsk: 2002.
- *Pashkov, L.T.* Combustion Theory Fundamentals (in Russian), Moscow: MPEI Publisher, 2002.
- *Anikeev, A.V., Rezunenkov, V.I., and Stepanov, K.A.*, Environmental Issues of the Sustainable Development of Power Industry in Russia), Vyakhirev, R.I., Moscow, Noosfera Publisher, 2001.
- *Izvekov, A.V., and Vinokurskij, A.L.* Heat, Steam, and Water Meters, Commercial Quantity Meters for Heat and Heat Transfer Medium (in Russian). Moscow. MPEI Publisher, vol. 3.
- *Larin, B.M., Moruganova, Yu.A., and Anikeev, A.V.*, Organic Compounds in Thermal Power Engineering (in Russian), Ivanovo PEI Publisher, 2001.
- *Volkov, E.P., Polivoda, A.I., and Polivoda F.A.* Environmentally Friendly Catalytic Thermal Power Stations with Turbine Expanders (in Russian), Izv. RAN. Energetika, 2002, no. 1, p. 3.
- *Mikhailov, S.A., Klimenko, A.V., Izvekov, A.V., et al.*, Main Provisions of the Conception for Development of the Heat Supply in Russia Including Municipal Heat Supply System for the Mid-Term Outlook, Inf. Byul. Gosgortekhnadzora Minenergo RF, Teplosnabzhenie, 2002, nos. 1–2, p. 5.
- *Kormilitsyn, V.I., Lyskov, M.G., and Kormilitsyna A.V.* Preparation of Water-Fuel Oil Emulsions for Combustion in Boiler Furnaces, Novosti Teplosnabzheniya, 2001, no. 2, p. 17.
- *Kormilitsyn, V.I., Shmyrkov, O.V., and Romahin, S.S.*, Calculation of Emulsor Devices, Energosber. Vodopodg., 2001, no. 3, p. 57.
- *Lyskov, M.G., Polyvoda, F.A., and Prokhorov V.B.*, Highly Efficient Self-Contained Environmentally Friendly Catalytic Thermal Power Stations. Part 1, Stroit. Mater., Oborud., Tekhnolog. XXI Veka, 2001, no. 5, p. 12.
- *Lyskov, M.G., Polyvoda, F.A., and Prokhorov V.B.*, Highly Efficient Self-Contained Environmentally Friendly Catalytic Thermal Power Stations, Part 2, Stroit. Mater., Oborud., Tekhnolog. XXI Veka, 2001, no. 6, p. 17.
- *Tupov, V.B.* Reducing the Noise Impact from Thermal Power Facilities on the Environment, Teploenergetika (Moscow), 2001, no. 1, p. 68.
- *Lyskov, M.G., Prokhorov, V.B., and Polyvoda F.A.*, A High-Efficient Catalytic Thermal Power Station, Novosti Teplosnabzh., 2001, no. 12.
- *Putilova, I.V., and Putilov V.J.* Utilization of Ash and Slag at Thermal Power stations of RAO EES Rossii, Abstract of Papers, IX Mezhd. Konf. "Zola Energetiki" (IX Int. Conf. "Ash in Power Industry).
- *Putilov, V.J. and Prjadko, B.I.* Protection of Heat Supply Pipelines against Corrosion and Environmental Protection, Izv. Akad. Prom. Ekolog., 2002, no. 3, p. 52.
- *Kormilitsyn, V.I.* Problems of Burning of Low-grade and Sub-standard Liquid Fuels in Boiler Furnaces, Abstract of Papers, Rossiisk. Nauchn. Prakt. Konf. "Energosberzhenie, ekologiya, effektivnost' (All-Russian Scientific and Engineering Conf. "Energy Saving, Ecology, Efficiency), Izhevsk: UdGU, 2002, p. 62.
- *Kormilitsyn, V.I., Kukleev, A.N., and Gorbunov, A.A.*, The Feasibility of Application of Installations for Condensing Water Vapors from Stack Gases in the Process Arrangement of a Thermal Power Station, Energosber. Vodopodg., 2002, no. 1, p. 31.

## ■ **Dissertations**

- ❑ *Polivoda, F.A.*, The Methodology and Physical Fundamentals for Investigation, Development, and Designing of Solar Thermal Photo-voltaic Power Stations with a Backup Pabalytic Steam Generator, Dr. Sci. (Techn.) Dissertation, 2002.

## ■ **Partners**

- ❑ RF Ministry of Nature
- ❑ OAO RAO EES Rossii (Unified Power System of Russia) company, Moscow
- ❑ State Unitary Enterprise "MOSTEPLOENERGO", Moscow
- ❑ All-Russia Thermal Engineering Institute, Moscow
- ❑ JSC "Institute VNIPIEnergoprom", Moscow
- ❑ JSC Institute for Thermal Station Design (Institute Teploelektroproekt)
- ❑ Institute Energoset'proekt, Moscow
- ❑ URALORGRES, Ekaterinburg
- ❑ JSC "URALVNIPIENERGOPROM", Ekaterinburg
- ❑ Enterprise for Power Station Maintenance (ORGRES Co.)
- ❑ JSC "Mosenergo", Moscow
- ❑ Power Engineering Institute (ENIN), Moscow

## ■ **Unique equipment**

- ❑ A 2800 Frequency analyzer 2800 and a 800 V noise-level meter 800V of "Larson & Davidson" Co. and other modern equipment for acoustic measurements

Tel.: (095) 362-7120

Fax: (095) 362-7351

E-mail: KuznetsovVD@mpei.ru

The department has on its staff  
20 lecturers,  
7 research workers,  
and 12 Ph.D. students

Head of Department:  
Vasilii D. KUZNETSOV  
Cand. Sci. (Tech.), Prof.

## ■ Main Lines of Research

### Research supervisors

- Investigations of severe accidents at nuclear power stations (NPS) with water-cooled reactors  
Prof. N.G. Rassokhin
- Analysis of NPSs safety and reliability  
Prof. V.D. Kuznetsov
- Estimation of the operability and service life of NPSs structural materials and equipment  
Prof. V.P. Gorbatykh
- Methods and means of NPSs technical diagnostics  
Prof. K.N. Proskuryakov
- Development of calculating theory for natural circulation, hydraulic characteristics and impurities distribution in NPS steam generating equipment  
Prof. V.I. Gorburov
- Development of an automated system for NPS flow diagrams simulation and calculation  
Prof. V.M. Zorin
- Selection of decommissioning strategy of NP units whose specified service life have expired  
Assoc.-Prof. M.A. Skachek
- Internal fuel cycles of VVER-type reactor  
Assoc.-prof. V.D. Baibakov
- Development of fundamentals and particular procedures for safety standards usage at NPSs and at other enterprises of the nuclear power industry  
Prof. S.A. Tevlin

## ■ Agreements, Contracts, Projects Supported by State Budget

- Reliability improving and ecological monitoring of atomic industry plants and power industry
- Development of a PC software package for hydrodynamics and impurities distribution calculations in the NPS steam generator with a submerged heating surface
- Development of system approach to ensuring the new generation NPS reliability and safety. Using the artificial intelligence approach in controlling the reliability and safety of the new generation of NPSs

- ❑ Development of a software code for thermal-physic processes simulation at solving the problems of severe accidents localization at NPSs with VVER-Reactors
- ❑ Validation of the fuel loading for the VVER-1000 reactors having fuel elements with asymmetrical fuel composition over their cross-sections
- ❑ Development of a system approach to the NPS safety
- ❑ Development of calculation codes for improving the NPS safety
- ❑ Development of NPS safety controlling methods

## ■ Key Publications

- ❑ *Proskuryakov, K.N.*, Parametric oscillations modeling in nuclear reactor cooling system. Izv. vuzov. Yadernaya energetika, 2001, no. 3, p. 98.
- ❑ *Tevlin, S.A.*, Research development on the safety standards at NPSs. Bull. po Atomnoi Energii, 2001, no. 9, p. 27.
- ❑ *Gashenko, I.V., Kuznetsov, V.D., and Shmal', I.I.*, Investigation of the heat losses influence and the heat accumulated by the installation steel-works on the thermal-hydraulic processes evolution. Thermal Engineering, 2001, no. 9, p. 776.
- ❑ *Vorobyev, Yu.B., and Kuznetsov, V.D.*, Advanced integral codes usage in controlling the NPS safety. Vestnik MEI, 2001, no. 5, p. 31.
- ❑ *Gorbatykh, V.P., Morozov, A.V., and Sokolov, D.F.*, New approaches to the metal service life evaluation of the main and auxiliary equipment at nuclear and thermal power stations. Abstracts of Papers, Industry Seminar "Advanced methods and means of the diagnostics of nuclear power installations". October 2-5, 2001, Obninsk, p. 84.
- ❑ *Gorburov, V.I., Zorin, V.M., Rassokhin, N.G., et al.*, On staged evaporation organization in a steam generator installation at NPS with VVER-1000 reactor. Thermal Engineering, 2001, no. 12, p. 998.

## ■ Dissertations

- ❑ *Chin Kyong*. Development of heat transfer calculation procedure for the problem of the molten core localization in a trap under the reactor during a severe accident at NPS, Cand. Sc. (Tech.) Dissertation, 2001.
- ❑ *Khlebnikov, A.A.* A spatial impurities distribution in steam generators of thermal and nuclear power stations under steady state conditions and in transients. Cand. Sc. (Tech.) Dissertation, 2002.
- ❑ *Dubar Ahmad*. Corrosion fatigue of the tube bundles in steam generators at NPS with VVER reactor. Cand. Sc. (Tech.) Dissertation, 2002.
- ❑ *Katkovskii, S.E.*, The processes of impurities rejection and hiding in steam generating facilities at nuclear and thermal power stations. Cand. Sc. (Tech.) Dissertation, 2002.

## ■ Partners

- ❑ Volgodonsk NPS, Volgodonsk
- ❑ All-Russian Institute for Nuclear Plant Research (VNIIAES), Moscow
- ❑ Fachhochschule, Zittau, Germany
- ❑ Dresden Technical University, Germany
- ❑ Kalininskaya NPS, Tverskaya oblast
- ❑ Research Center for Nuclear and Radiation Safety, Gosatomnadzor of the Russian Federation, Moscow
- ❑ Special Design Bureau (OKB) Hidropress, Podol'sk, Moscow region

- ❑ Russian Scientific Center “The Kurchatov Institute”, (RNTs KI), Moscow
- ❑ Elektrogorsk Research Center for Safety of Nuclear Power Stations, Elektrogorsk, Moscow region

### ■ **Unique Equipment**

- ❑ Complex of instruments and analyzers for monitoring of vibration characteristics, made by Bruil & Kier Co.
- ❑ Analytical simulator for an NPS with a VVER-1000 Reactor
- ❑ Subcritical uranium – water test rig
- ❑ Test desk for investigation of heat transfer and corrosion processes

Tel.: (095) 273-2157

Fax: (095) 362-7786

E-mail: Yagov@itf.mpei.ac.ru

The department has on its staff

21 lecturers,

16 research workers,

and 6 Ph.D. students

Head of Department:

Victor V. YAGOV

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 substances thermophysical properties 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  
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 researches, tests, control, and diagnostics  
Prof. V.G. Sviridov
- Experimental investigation of heat irradiation and water and water solutions boiling mechanism  
Prof. Yu.A. Kuzma-Kichta
- 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

## ■ Agreements, Contracts, Projects Supported by State Budget

- Investigation and intensification of heat transfer at boiling in forced motion
- Heat transfer mechanism investigation at mixtures boiling and condensing

- ❑ Boiling crisis mechanism and accessible heat loading levels in high-velocity swirl flows of under-heated liquids
- ❑ Investigation of the energy and charge transfer processes in the Earth atmosphere as applied to ecological problems
- ❑ Heat transfer investigation at low mass velocities and pressures as applied to evaporator of boiling type
- ❑ Boiling process investigation using laser and acoustic diagnostics technique
- ❑ Heat transfer at vapor mixtures condensation finned tubes
- ❑ Development of a vapor-compressing machine operating on ecologically clean refrigerant for food processing technology lines
- ❑ 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
- ❑ Systems development for experimental investigations automation
- ❑ Numerical modeling of heat and mass transfer in fuel tanks with cryogenic fuel
- ❑ Heat processes theoretical and experimental investigation 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
- ❑ Research of physical, chemical and thermal processes in hydro-metallic accumulators of hydrogen for equipment using renewed power resources
- ❑ Development of mathematical models and a software package for calculating the two-dimensional velocity field in a cylindrical heat exchanger
- ❑ Numerical models of heat and mass transfer processes in power installations and comprehensive optimization of their performance
- ❑ Modeling of thermal-physical processes and strength characteristics of facilities for cooling and confinement of the melted core of a VVER-reactor for substantiating the prolonging of the planned service life
- ❑ Development of mathematical models and software for analyzing and characteristics optimization of metal hydride accumulators of hydrogen for vehicles
- ❑ Numerical and analytical investigation of hydrodynamics and heat transfer in a flow over bodies of complex shape
- ❑ Numerical investigations of heat exchangers with high velocities of heat transfer mediums
- ❑ Designing of a test section of the installation for fine cleaning of hydrogen against impurities
- ❑ Analysis of liquid-vapor flow models and development of a working version of a fragmentary computer code for models verification
- ❑ Development of a portable automated system for the spectral analysis of processes in a wide frequency range
- ❑ Physical models and a procedure for predicting heat transfer and the boiling crisis for binary liquid mixtures and salt solutions

- ❑ Investigation of boiling characteristics for multi-component liquid mixtures
- ❑ Thermal-physics of non-equilibrium processes
- ❑ Scientific workshop: "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

- ❑ *Labuntsov, D.A., and Yagov, V.V.* Two-Phase System Mechanics (in Russian), Moscow, MPEI Publisher, 2001.
- ❑ *Theoretical* Fundamentals of Thermal Engineering. Thermal Engineering Experiment (in Russian), Section 1. Mechanics of Gases and Liquids; Section 3. Fundamentals of Heat and Mass Transfer. Klimenko, A.V. and Zorin, V.M., Moscow. MPEI Publisher, 2001, vol. 2,
- ❑ *Yagov, V.V.* Bubble Growth Rate at Pool Boiling in Wide Range of Reduced pressures, Int J. Heat & Technology, 2001, vol. 19, no. 2, p. 17.
- ❑ *Sinkevich, O.A., and Chikunov, S.E.*, Numerical Modeling of Two-Phase Flow in the Tornado Funnel (in Russian). High Temperature (Moscow), 2002, vol. 40, no. 4, p. 604.
- ❑ *Sinkevich, O.A., and Sosnin, V.E.* Singularities of Ionization-Field Instability and Structurization of Plasma of High-Pressure Non-self-Maintained Free-localized Discharge in the Field of a Quasi-Monochromatic UHF waves (in Russian). High Temperature, 2001, vol. 39, no. 2, p. 198.
- ❑ *Glazkov V.V., Zeigarnik, Yu.A., Zhilin, V.G., et al.*, Explosive Mode of the Instability Development Leading to Destruction of the Vapour Film on a Heated Hemispherical Solid Surface (in Russian), Dokl. RAN, 2001, vol. 376, no. 3, p. 328.
- ❑ *Makhrov, V.V., and Miroshnichenko, V.I.*, Experimental Study of Thermal Conductivity and the Temperature Jump in Binary Mixtures of Non-reacting Gases with a Condensable Component (in Russian), Inzh. Fiz. Zhurn., 2001, vol. 74, no. 5, p. 136.
- ❑ *Semenov, A.M., and Zakharova, O.D.*, The Validity Limits for the Ideal Gas Model in Describing the Properties of Alkali Metal Vapour (in Russian), High Temperature (Moscow), 2001, vol. 36, no. 6, p. 905.
- ❑ *Alexandrov A.A., Grigoriev B.A., Ustjuzhanin E.E., Altunin V.V. et al.*, Thermodynamic Properties of Ozone Friendly Substances: Individual and combined Refrigerants (in Russian). High Temperatures – High Pressures, 2001, vol. 33, p. 563.
- ❑ *Semenov, A.M.*, Numerical Simulation of Entropy Generation Dynamics in One-Dimensional Non-steady Thermally Non-uniform System (in Russian). High Temperature, 2002, vol. 40, no. 2, p. 347.
- ❑ *Kuzma-Kichta, Yu.A., Sedlov, A.S., Buyakov, D.V., and Kartsev, A.S.*, Improvement of Heat Pump Evaporators (in Russian). Electronic Journal: Novoe v Rossiiskoi Elektroenergetike, 2002, no. 3, p. 17.
- ❑ *Makarov, M.V., and Yan'kov, G.G.*, Numerical Modelling of Heat and Mass Transfer in a Cryogenic Fuel Tank, Proceedings of III rd Russian National Conference on Heat Transfer, Moscow, MPEI Publisher, vol. 3, p. 1020.
- ❑ *Artemov, V.I., Ginevskii, A.F., and Povitskii, N.I.*, Numerical Modelling of the Processes in the Thermal Head of a Jet Printer (in Russian), Proceedings of III rd Russian National Conference on Heat Transfer, Moscow. MPEI Publisher, vol. 4, p. 221.
- ❑ *Artemov, V.I., Yan'kov, G.G., Lazarev, D.O., et al.*, Numerical Modelling of Heat and Mass Transfer in Metal Hydride Accumulators of Hydrogen, Proceedings of XIII Russian National Conference on Heat Transfer, Moscow. MPEI Publisher, vol. 5, p. 157.

- ❑ *Lazarev, D.O.*, Analysis of the Closing Relationships for Calculating the Heat Transfer Coefficient in Bubble Boiling Implemented in the Calculation Code KORSAR, Proceedings of IIIrd Russian National Conference on Heat Transfer, Moscow. MPEI Publisher, vol. 8, p. 7.

## ■ **Partners**

- ❑ Technical University, Berlin, Germany
- ❑ University, Stuttgart, Germany
- ❑ Tupolev Aircraft Scientific and Engineering Complex, Moscow
- ❑ Lomonosov Moscow State University (MGU), Chemical Faculty
- ❑ Kaluga Turbine Works (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 (VNIAM), 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

## ■ **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
- ❑ Workstation for studying new information technologies

Tel.: (095) 362-7865  
E-mail: ofys@mpei.ru

The department has on its staff  
39 lecturers,  
and 4 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 surface  
Assoc. Prof. V.P. Afanas'ev
- Measuring the substances properties using optical-electronic methods  
Assoc. Prof. Yu.I. Malakhov, Prof. V.P. Kobelev
- Experimental and theoretical investigation of heat and mass transfer under phase transformation conditions with ultra-high energy density  
Prof. A.T. Komov
- Research of composite materials properties and development of procedure for their manufacturing  
Assoc. Prof. A.N. Varava, Assoc. Prof. V.S. Spivak
- 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 a scientific complex for training specialists for the Russian Ministry of atomic energy
- Perfection of the program for training Russian specialists in nuclear fusion
- Investigation of pulsations in the wall temperature and the flow parameters in pre-crisis heat transfer regimes
- Research of the heat exchange crisis mechanism in a sub-cooled liquid
- Quantitative electronic spectroscopy
- Comprehensive investigation of interaction between electron flows and multi-component surfaces and of heat exchange in the receivers for high energy fluxes
- Real-time mode electronic spectroscopy for determining the composition and layer-wise composition of structural materials inverted to high-temperature plasma

## ■ Key Publications

- *Komov, A.T., Varava, A.N., Dedov, A.V., and Semashko, N.N.*, Limiting Heat Loadings to the Beam Dumps in the Systems of Injection Plasma Heating, Plasma and Devices, 2001, vol. 9, no. 3-4, 2001. p. 227.
- *Komov, A.T., Varava, A.N., Dedov, A.V., and Semashko, N.N.*, Some Heat Exchange Features in the High Power Beam Dumps, Plasma and Devices, 2001, vol. 9, no. 3-4, p. 211.
- *Komov, A.T., Varava A.N., Dedov, A.V., and Yagov V.V.*, Boiling Heat Transfer in Swirl Flow of Sub-cooled Water, Heat transfer, Proceeding of XII International Heat Transfer Conference, Grenoble, France, 2002, p. 731.

- ❑ *Komov, A.T., Dedov, A.V., Varava, A.N., and Yagov V.V.*, Specific Features of Heat Transfer in a Sub-cooled Swirl Flow, Proceedings of the IIIrd Russian National Conference on Heat Transfer, Moscow, October 21–25, 2002, vol. 4, p.76.
- ❑ *Komov, A.T., Dedov, A.V., Varava, A.N., and Yagov V.V.*, About the Thermodynamic Limit of the Critical Heat Load for Boiling in a Sub-cooled Swirl Flow, Proceedings of the IIIrd Russian National Conference on Heat Transfer, Moscow, October 21–25, 2002, vol. 4, p. 207.
- ❑ *Kulygin, V.M., Belyaev, V.A., and Chernenko, P.A.*, PNX-U Experimental Results Super –CCNB/ITER NBI R&D, Review Meeting, Ringberg, Germany, April 29 – 30, 2002. Semashko, N.N., Development Prospects of Nuclear Power Engineering and of Its Management on the Basis of the New Generation of Technologies, Radioelektronika I upravlenie, 2002, vol. 4–6, p. 46.
- ❑ *Kulygin, V.M., and Belyaev, V.A.*, Plasma Neutralizer ITER injector, IV Intern. Conf. on Open Systems for Plasma Confinement, Cheju Isl., Korea, July 2002.
- ❑ *Semashko, N.N., Belyaev, V.A., and Dubrovin M.M.*, The Operation Modes of the Plasma Neutralizer model for the ITER injector, Int. Conf. "Engineering Problems of Nuclear Fusion Reactors", St. Petersburg, October 28 – 31, 2002.
- ❑ *Evseev, A.I., Savkin, A.N., and Sedov A.N.*, Experience with Staged Development of the Computer Teaching by an Example of the subject "Physics", All-Russia Conf. "Modern Teaching Environment", Moscow, November 1-4, 2002.
- ❑ *Belevtsev, A.A, Isakaev, E.H., Markin, A.V., and Chinnov V.F.*, Spectroscopic Analysis of Spatial Distribution of the Electron Temperature and Concentration in High-Enthalpy Flows of Argon and Nitrogen Plasma, High Temperature, 2002, vol. 40, no. 1, p. 21.
- ❑ *Chinnov V.F.*, On a Role of VUV-Radiation in the Anode Region of High-Current Plasma Generators with Diverging Anode Channel, High Temperature, 2002, vol. 40, no. 4, p. 489.
- ❑ *Afanas'ev, V.P., Lubenchenko, A.V., Tsukanov, V.V., and Fedorovich, S.D.*, Energy Spectrum of Electrons Reflected from a Three-Layer Structure, Abstracts of Papers, XXXII Meeting on Physics of Interaction of Charged Particles with Crystals, Moscow, 2002, p. 52.
- ❑ *Afanas'ev, V.P., Lubenchenko, A.V., Pavolotski, A.B., et al.*, Diagnostics of Multi-component Surfaces of Construction materials on the Basis of Reflected Electrons Spectrum, Kontrol'. Diagnostika, 2002, no. 7, p. 41.
- ❑ *Afanas'ev V.P., Lubenchenko, A.V., Pavolotski, A.B., and Fedorovich, S.D.*, Reflection of Electrons with KV-Range Energies from Multi-component Targets, ZhTF, 2002, vol. 72, p. 100.
- ❑ *Lubenchenko, A.V.*, Application of Methods Developed in the Transport Radiation Theory to Solving Problems in Dispersion of Charged Particles in Solids, Vestnik MEI, 2002, no. 3, p. 83.
- ❑ *Afanas'ev, V.P., Lubenchenko, A.V., and Fedorovich, S.D.*, Reflection of Electrons with KV-Range Energies from Multi-component Surfaces, Poverkhost'. Rentgenovskie, Sinkhrotronnye i Neitronnye Issledovaniya, 2002, no. 12, p. 82.

## ■ Dissertations

- ❑ *Chinnov, V.F.*, Experimental Investigation of the Thermal and Non-equilibrium Plasma of Inert and Molecular Gases, Dr. Sci. (Phys.Math.) Dissertation, 2002.
- ❑ *Markin, A.V.*, Experimental Investigation of the Emission Features and Parameters of Highly Ionized Argon and Nitrogen Plasma at the Atmospheric Pressure, Cand. Sci. (Tech.) Dissertation, 2002.

## Partners

- ❑ Moscow Institute of Engineering Physics (MIFI), Moscow
- ❑ Moscow Physical and Technical Institute (MFTI), Moscow
- ❑ Bauman Moscow State Technical University (Bauman MGTU), Moscow
- ❑ St. Petersburg State Technical University (SPbGTU), Saint-Petersburg
- ❑ Russian Scientific Center "The Kurchatov Institute" (RNTs KI), Moscow
- ❑ Research Institute of Nuclear Physics of the Moscow State University (NIIYAF MGU), Moscow
- ❑ Institute of High Temperatures Scientific Association, Russian Academy of Sciences (IVTAN), Moscow
- ❑ Efremov NII-EFA, Saint-Petersburg
- ❑ Joint Institute for Nuclear Research (OIYAI), Dubna, Moscow region.
- ❑ State Unitary Enterprise "The Dollezhal Research and Design Institute for Power Engineering" (FGUP NIIKIET), Moscow
- ❑ Ioffe Physical and Technical Institute, Saint-Petersburg
- ❑ Analytical Center for Investigation of Surface Properties, Moscow
- ❑ Max Plank Institute, Germany
- ❑ Institute of Electronics, Tashkent, Uzbekistan

## Unique Equipment

- ❑ Test facility for Investigation of Material Properties Using the Spectroscopy of Reflected Electrons
- ❑ Test desk for secondary ion mass-spectrometry
- ❑ Spectral-photo-metrical experimental facility
- ❑ Workbench "Polarization Probing"
- ❑ Test desk for investigation of the heat transfer crisis in nuclear fusion beam receivers designed for operation at the high density of the energy
- ❑ The automatic data acquisition system uses the KAMAK standard and the MEK 625.1 instrument interface
- ❑ Process installation for making models of composite specimens on the basis of polymer matrices using direct and alternating electromagnetic fields

# INSTITUTE OF PROBLEMS IN ENERGY EFFICIENCY

## Director of the Institute

**Aleksandr V. KLIMENKO**  
**Dr. Sci. (Tech.), Prof.,**  
**Corresponding Member**  
**of the Russian Academy of Sciences**

**Tel.: (095) 362-5633, (095) 362-7338**

**Fax: (095) 273-3383**

**E-mail: [KlimenkoAV@mpei.ru](mailto:KlimenkoAV@mpei.ru)**

## Departments and Divisions of the Institute

- **Department of industrial heat-and-power engineering systems ..... 3.2**
- **Department of high-temperature technologies energetics ..... 3.5**
- **Department of industrial economics and of management enterprises ..... 3.9**
- **Department of heat- and mass-transfer processes and facilities ..... 3.11**
- **Department of chemistry and electrochemical power engineering ..... 3.14**
- **Scientific-and-technical innovations center of energy-conservation technologies and equipment ..... 3.16**
- **Research laboratory of global energy problems ..... 3.20**

Tel./Fax: (095) 362-7553, (095) 362-7578

E-mail: [PTES-all@mpei.ru](mailto:PTES-all@mpei.ru); [PTES@mpei.ru](mailto:PTES@mpei.ru)

The department has on its staff

19 lecturers,

3 research workers,

and 15 Ph.D. students

Head of Department:  
Vyacheslav A. RYZHENKOV

Dr. Sci. (Tech.), Prof.,

Corresponding Member  
of the Academy of Environmental Engineering

## ■ Main Lines of Research

---

### Research supervisors

- Resource and energy saving in systems of industrial and municipal objects heat supply

Prof. V.A. Ryzhenkov

- Analysis, investigation of and improvements in combined cycles involving the use of heat-pump and refrigeration facilities. Raising the efficiency of air supply systems for industrial enterprises

Prof. N.V. Kalinin

- Analysis of the operating modes of heat converters (heat pumps and refrigeration facilities)

Assoc. Prof. A.V. Martynov

- Development of the principles of the energy-conservation policy for systems of heat-and-power supply to industrial enterprises

Prof. V.V. Galaktionov

- Energy-conservation trends in technical progress in industrial production based on the use of highly efficient thermal schemes and enhancement of heat and mass transfer

Prof. A.Ya. Shelginskii

- The use of gas-turbine facilities in systems of heat supply to small towns from water-boiler houses

Prof. B.G. Borisov

- Mathematical modeling and optimization of energy-technology systems of metallurgical works from the standpoint of energy and environmental efficiency

Assoc. Prof. I.A. Sultanguzin, Res. Lab. Head V.G. Khromchenkov

- Assessment of environmental impact in keeping with the Impact Pathway methodology

Assoc. Prof. I.A. Sultanguzin

- Energy audit and improvements in systems of heat-and-power supply to industrial enterprises

Res. Lab. Head V.G. Khromchenkov

- Physical models of anisotropic turbulence

Prof. V.P. Motulevich

- Probabilistic estimation of the power-engineering systems safety. Reliability of heat-and-power engineering systems

Assoc. Prof. V.N. Papushkin

- Utilization systems calculation and optimization of blast-furnace gas excess pressure in expansion turbines

Res. Lab. Head V.G. Khromchenkov

## ■ **Agreements, Contracts, Projects Supported by State Budget**

- Development of a range of autonomous heat sources for heating and hot-water supply of lecture rooms and other educational environment objects
- Development of an optimal system for heat-and-power supply of a large industrial center
- Resistance and heat transfer of bodies in a flow of liquid in the presence of mechanical effects
- Development of an automatic system of on-line planning and control of operating modes of an energy-technology system
- Development of systems of heat-and-refrigeration supply to industrial enterprises using secondary energy resources
- Heat-pump facilities in energy supply systems
- Development of automatic software-and-information system for planning the development of and improvements in the energy-technology system of Cherepovets metallurgical works
- Assessment of environmental impact in keeping with the Impact Pathway methodology
- Correlation model of dynamic and thermal interaction of flows with bodies in the presence of homogeneous and heterogeneous chemical processes
- Optimization of systems of heat-and-power supply to industrial enterprises based on the results of energy-ecology analysis

## ■ **Key Publications**

- *Reutov, B.F., Ryzhenkov, V.A., Pyzhov, I.N., and Arbuzov, V.V.*, Enhancement of Heat Transfer and Corrosion Protection (in Russian), in Russian Energy-Efficient Technologies, Moscow: "Fabrika Ofsetnoi Pechati" Publisher, 2002, issue 1(3), p. 28.
- *Dobrokhoto, V.I., Ryzhenkov, V.A., Kurshakov, A.V., and Pogorelov, S.I.*, Raising the Efficiency of Utilization of Industrial and Municipal Heat Supply Systems by Removing and Precluding the Formation of Deposits and Corrosion Products (in Russian), in Abstracts of Papers to IV International Scientific-and-Technical Conference on Energy Demand and Energy Conservation: Problems and Solutions, Perm, 2001, p. 80.
- *Ryzhenkov, V.A., Kurshakov, A.V., and Volkov, A.V.*, Universal Technology for Cleaning and Raising the Efficiency of Heat-Exchange Equipment (in Russian), Kholod. Biznes, 2002, no. 6, p. 36.
- *Kalinin, N.V. and Lunin, A.A.*, Combined Facility for Simultaneous Production of Heat and Cold in the System of Heat-and-Cold Supply of a Production Complex. Resource Saving and Environmental Safety (in Russian), in Proceedings of III All-Russia Scientific-and-Practical Conference, Smolensk, 2001, "GP Smolenskaya gorodskaya tipografiya" Publisher, 2001, p. 3.
- *Motulevich, V.P.*, Solar Greenhouses, in Proceedings of 7<sup>th</sup> Arab International Solar Energy Conference, Sharjah, 2001, p. 471.
- *Martynov, A.V., Kalinin, N.V., and Lunin, A.A.*, Heat Pumps and Their Importance from the Standpoint of Energy Conservation (in Russian), Energ. Eff., 2001, no. 29, p. 11.

- ❑ *Khromchenkov, V.G.*, Experimental Investigation of Sectors of Heating Network within PVZhF Projects in the Cities of Vladimir and Izhevsk (in Russian), Practices of Energy and Water Conservation, Information Bulletin, 2000-2001, issue IX—X, p. 81.
- ❑ *Lunin, A.A. and Kalinin, N.V.*, Combined Production of Heat and Cold (in Russian), ASEM – Russian Association of Energy Managers, 2002, issue 25, p. 19.
- ❑ *Khalepa, A.A.*, Optimization of the System of Municipal Sector Heat Supply (in Russian), in Energy Conservation — Theory and Practice: Proceedings of the First All-Russia Seminar School for Young Scientists and Specialists, Moscow, MPEI Publisher, 2002, vol. 1, p. 27.
- ❑ *Khromchenkov, V.G., Tishchenko, A.A., and Yavorovskii, Yu.V.*, Energy Conservation as a Result of Modernization of Housing Resources (in Russian), in Energy Conservation — Theory and Practice: Proceedings of the First All-Russia Seminar School for Young Scientists and Specialists, Moscow. MPEI Publisher-, 2002, vol. 1, p. 100.
- ❑ *Martynov, A.V.*, Development of a Range of Autonomous Heat Sources (in Russian), in All-Russia Conference on Scientific Principles of the Federal-and-Regional Policy in the Field of Education, Vladimir, 2002, p. 267.

## ■ **Partners**

- ❑ Ecole de Mine de Paris, Paris France
- ❑ Severstal' Metallurgical Works, Cherepovets
- ❑ Technical University, Dresden, Germany
- ❑ University of Pisa, Italy
- ❑ Armstrong International, Inc., USA
- ❑ Mosgorteplo heat supply system, Moscow

## ■ **Unique Equipment**

- ❑ Dual-purpose heat pump
- ❑ Nonadiabatic vortex tube
- ❑ Expander with internal valve drive
- ❑ System of decentralized heat supply utilizing a vortex heat generator

Tel./Fax: (095) 362-7125

E-mail: [EVT-all@mpei.ru](mailto:EVT-all@mpei.ru); [EVT@mpei.ru](mailto:EVT@mpei.ru)

The department has on its staff

14 lecturers,

5 research workers,

and 6 Ph.D. students

Head of Department:

Igor P. MOROZOV

Cand. Sci. (Tech.), Prof.

### ■ Main Lines 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 utilization of heat

Prof. I.P. Morozov

- Development of conceptual trends of intensive energy conservation 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 conservation developed in the Department of High-Temperature Technologies Energetics of the Moscow Power Engineering Institute

Prof. A.D. Klyuchnikov

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

Prof. L.N. Sidel'kovskii, Sr. Researcher V.A. Tumanovskii

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

Sr. Researcher V.A. Tumanovskii

- Optimization of regional fuel-and-energy balances

Prof. L.N. Krivorukii

- 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

- Energy audit 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

Sr. Researcher V.M. Smirnov

- 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 mathematical models of thermal-technology systems and complexes

Assoc. Prof. S.K. Popov

- Development of energy-saving environmentally clean thermal-technology systems and reactors for pyrorefining liquid, paste-like, and solid industrial waste and for processing this waste to form a marketable product

Assoc. Prof. V.I. Volkov, Assoc. Prof. V.A. Ippolitov, Assoc. Prof. T.A. Stepanova

- Certification and other tests of gas and liquid-fuel burners and gas-utilizing equipment

Sr. Researcher V.M. Smirnov

## ■ **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 hydrothermal processing of phosphate stock to mineral fertilizers and fodder additives
- Development of a cyclone-type skull glass-making furnaces for making high-modulus charges in a system of liquid-glass production by the sulfate and soda technologies  
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
- Energy audit of enterprises in the construction and chemical industry
- Development of automatic systems of  $\text{NO}_x$  suppression in metallurgy
- Development 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**

- *Troyankin, Yu.V.*, Design and Operation of High-Temperature Technological Facilities: A Textbook (in Russian), Moscow. MPEI Publisher, 2002.
- *Popov, S.K.*, Mathematical Model of Melting of a Moving Hollow Cylinder under Conditions of a Melting Chamber with a Perforated Bed (in Russian), Vestn. Mosk. Energ. Inst., 2002, no. 3, p. 56.
- *Popov, S.K. and Morozov, I.P.*, New Information Means of Training in the Field of High-Temperature Thermal Technology (in Russian), in Information Means and Technologies: Abstracts of Papers to the International Conference, Moscow. Yanus-K Publisher, 2002, vol. 2, p. 91.
- *Pavlov, M.A. and Morozov, I.P.*, Development of Heat Supply under Conditions of Free Market: Characteristic Features (in Russian), in Energy Conservation—Theory and Practice: A Collection of Scientific-and-Technical and Methodic Papers and Reports, Moscow. Amipress Publisher, Part 1, p. 64.

- *Klyuchnikov, A.D. and Napalkov, N.G.*, Large-Scale Reserves of Energy Saving through the Use of Flaming Metallurgical Slag in Ferrous Metallurgy (in Russian), in Abstracts of Papers to II International Scientific-and-Practical Conference on Automated Furnace Units and Energy-Saving Technologies in Metallurgy, Moscow, 2002, MISiS Publisher (Moscow Inst. of Steel and Alloys), 2002, p. 173.
- *Troyankin, Yu.V., Sokolov, B.A., and Smirnov, V.M.*, Energy Efficient and Environmentally Safe Production of Liquid Glass for the Needs of a Metallurgical Enterprise (in Russian), in Abstracts of Papers to II International Scientific-and-Practical Conference on Automated Furnace Units and Energy-Saving Technologies in Metallurgy, Moscow, 2002, MISiS Publisher (Moscow Inst. of Steel and Alloys), 2002, p. 311.
- *Kuz'min, V.N. and Ushakov, A.A.*, A Thermal-Technology System for the Production of Steel Slag-Based Molten Cement Clinker (in Russian), in Abstracts of Papers to II International Scientific-and-Practical Conference on Automated Furnace Units and Energy-Saving Technologies in Metallurgy, Moscow, 2002, MISiS Publisher (Moscow Inst. of Steel and Alloys), 2002, p. 326.
- *Troyankin, Yu.V., Smirnov, V.M., and Fil'kova, V.M.*, Designing the Flow Passage of Annular Cyclone Chambers for the Production of Silicate Melts (in Russian), *Steklokeramika*, 2002, no. 7, p. 9.
- *Krivorutskii, L.D., Antonov, G.A., Belykh, S.Yu., and Yarygin, Yu.N.*, Methods of Approaching the Assessment of Risks and Chances for Success in Realizing Regional Energy Programs (in Russian), in *Methods and Means for the Investigation of Regional Energetics*, Apatity: KNTs RAN (Coordination Scientific Center, Russian Acad. Sci.), 2002, p. 57.
- *Klyuchnikov, A.D. and Kartavtsev, S.V.*, Possible Limits of Minimization of Resource Expenditure in a Thermal-Technology Complex in Ferrous Metallurgy (in Russian), *Izv. Vyssh. Uchebn. Zaved. Chern. Metall.*, 2002, no. 7.

## Partners

- All-Russia Research Institute of Chemical Industry (VNIIKhT), Moscow
- Promotkhody (Industrial Waste) State Enterprise, Moscow
- Fertilizer and Fungicide Research Institute (NIIUIF), Moscow
- NPO Tekhnergokhimprom 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 commissioning-and-adjustment directorate, Moscow

## Unique Equipment

- 1-MW<sub>t</sub> 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 pyrorefining of a wide range of solid and paste-like waste
- Cyclone reactor for pyrorefining 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 pyrorefining 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 drive

Tel.: (095) 362 77 51, (095) 362-7730

Fax: (095) 362-7730

E-mail: [EPOP@mpei.ru](mailto:EPOP@mpei.ru)

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

Head of Department:  
Nikolai D. ROGALEV  
Dr. Sci. (Tech.), Prof.

## ■ Main Lines of Research

---

### Research supervisors

- Development of the infrastructure of an innovation complex. Development of standards, legal regulations, and methods in the sphere of scientific innovative activities of educational systems  
Prof. N.D. Rogalev
- Ecology and nature management. Environmental monitoring  
Prof. N.D. Rogalev
- Economic and managerial problems of energy conservation  
Prof. N.D. Rogalev
- Research into marketing management of economy with a view to using the research results for educational purposes  
Prof. N.N. Kozhevnikov
- Development of methods for the economic efficiency assessment of investment projects  
Prof. N.N. Kozhevnikov
- Technology transfer and the commercialization of technologies in a university  
Prof. N.D. Rogalev

## ■ Agreements, Contracts, Projects Supported by State Budget

- Investigation of atmospheric pollution by heat-and-power engineering and motor vehicle emissions and assessment of economic damage
- Investigation of stages of innovation companies growth for the purpose of predicting the region economic development (illustrated by examples in ecology, electronics, instrument making, and medicine)
- Technological and economic problems associated with accounting and conservation of thermal energy during its transportation
- Development of methodic principles and practical recommendations for the assessment of economic efficiency when selecting options of technical solutions in energy conservation
- Reduction of harmful effect on the atmosphere by the energy complexes of large cities

## ■ Key Publications

- *Rogalev, N., Bortnik, Y., Polyakov, S. et al.*, Russia's Innovation Companies' Growth Stage Investigation. Moscow Power Engineering Institute. Fund for Assistance to Small Innovative Enterprises, Proc. 6<sup>th</sup> Int. Conf. on Technology Innovation and Policy, Kansai, 2002.

- ❑ *Baidakov, S.L. and Rogalev, N.D.*, Integrated Territorial Approach to Raising the Energy Efficiency of Urban Public Utilities (in Russian), Energoberezhnie, 2002, no. 1, p. 17.
- ❑ *Rogalev, N.D., Gasho, E.G., Kurdyukova, G.N., and Kuz'kina, E.V.*, Improvements in Systems of Transportation and Distribution of Thermal Energy in Large Cities (in Russian), in Electronic Conference on the Subprogram of Fuel and Energy, Moscow. MPEI Publisher, 2002, p. 46.
- ❑ *Klimenko, A.V. and Rogalev, N.D.*, Initial Steps towards Developing a Russo-Chinese Technopark (in Russian), Presentations to the All-Russia Scientific-and-Practical Conference on the Status and Prospects for Development of Innovative Activities in the Educational System of Russia, Krasnodar, 2002, p. 81.
- ❑ *Rogalev, N.D., Klimenko, A.V., and Serebryannikov, S.V.*, Personnel Training for the Purpose of Accelerating the Transfer of Technologies and Commercialization of Research Results (in Russian), Innovatsii, 2001, nos. 1—2.
- ❑ *Rogalev, N.D., Tabachnyi, E.M., and Akhmedzhanova, O.P.*, Analysis and Development of Models of Diffusion of Products (in Russian), Vestnik MEI, 2002, no. 4, p. 57.
- ❑ *Fedorov, E.V. and Fedorov, D.V.*, Private Property and Financial Leasing in Small-Scale Energetics, Kaluga. KPGU Publisher (Kaluga State Polytechnic Univ.), 2002.
- ❑ *Zubkova, A.G. and Maslov, A.N.*, Solving the Problems of Consultative Services Efficiency when Introducing Corporative Information Systems (in Russian), Ekonomika i korporatsiya, 2002, no. 2.

## ■ Partners

- ❑ OAO RAO EES Rossii (Unified Power System of Russia) company, Moscow
- ❑ Science Park of MPEI (Moscow Power Engineering Institute), Moscow
- ❑ ZAO ESKOTEK company, Moscow
- ❑ ZAO TURBOKON scientific-and-production association for commercialization of products, Kaluga, Russia
- ❑ University of Ulaan-Baatar, Ulan-Bator, Mongolia

Tel.: (095) 362-7149

E-mail: [PavlovJM-all@mpei.ru](mailto:PavlovJM-all@mpei.ru)

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

Head of Department:  
Yurii M. PAVLOV  
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 when 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 the 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 in 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 raising the professional skill of specialists in educational establishments in the sphere of energy conservation
- Development of design methods for calculation of recuperative and direct-contact heat exchangers for steam-gas mixtures
- Development of a complex of educational methods for training in "Energy saving in power industry and technologies"
- Development of scientific principles of energy conservation for thermal-technology facilities with nonuniform 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

- ❑ *Valueva, E.P.*, Features of the Process of Convective Heat Transfer in a Turbulent Flow of a Compressible Liquid in a Pipe under Conditions of Resonant Oscillation of the Flow Rate (in Russian), *Teploenergetika*, 2001, no. 3, p. 29.
- ❑ *Valueva, E.P.*, Turbulent Flow of Gas in a Round Pipe (in Russian), *Teplofiz. Vys. Temp.*, 2002, vol. 40, no. 1, p. 77 (High Temp. (Engl. transl.), vol. 40, no. 1, p. 70).
- ❑ *Valueva, E.P.*, Heat Transfer in a Turbulent Flow of Gas in a Tube under Conditions of Resonance Oscillation of the Flow Rate (in Russian), *Teplofiz. Vys. Temp.*, 2002, vol. 40, no. 3, p. 442 (High Temp. (Engl. transl.), vol. 40, no. 3, p. 405).
- ❑ *Sergievsii, E.D., Medvedev, A.V., and Nassar, Ya.A.*, Heat Transfer in a Flat Air Solar Collector (in Russian), *Vestnik MEI*, 2001, no. 5, p. 25.
- ❑ *Valueva, E.P. and Domoratskaya, T.A.*, Assessment of the Thermohydraulic Efficiency of Recuperative Heat Exchangers (in Russian), *Teploenergetika*, 2002, no. 3, p. 43.
- ❑ *Zakharov, S.V. and Pavlov, Yu.M.*, Physical Model of Boiling Crisis in Channels in the Region of High Reduced Pressures (in Russian), *Vestnik MEI*, 2002, no. 4, p. 5.
- ❑ *Garyaev, A.B. and Tseplyaeva, E.V.*, A Mathematical Model for Describing Processes of Heat and Mass Transfer in Heat Exchangers with Precipitation of Moisture from Steam-Gas Mixtures (in Russian), in *Proceedings of the International Scientific-and-Practical Conference on Modern Energy-Saving Thermal Technologies (drying and heat-and-moisture treatment of materials)*, Moscow: MGAU Publisher, 2002, vol. 2, p. 110.
- ❑ *Danilov, O.L.*, A Nonconventional Method of Energy Saving in Drying Facilities (in Russian), in *Proceedings of the International Scientific-and-Practical Conference on Modern Energy-Saving Thermal Technologies (drying and heat-and-moisture treatment of materials)*, Moscow: MGAU Publisher, 2002, vol. 2, p. 116.
- ❑ *Danilov, O.L., Konoval'tsev, S.I., and Shuvalov, S.Yu.*, The Use of Mathematical Simulation in Studying the Effect of External Nonuniform Fields on the Process of Drying Dispersed Liquids (in Russian), in *Proceedings of the International Scientific-and-Practical Conference on Modern Energy-Saving Thermal Technologies (drying and heat-and-moisture treatment of materials)*, Moscow: MGAU Publisher, 2002, vol. 2, p. 66.
- ❑ *Valueva, E.P. and Kulik, A.A.*, The Dynamic Characteristics of a Gas Pipeline under Conditions of Pulsating Turbulent Flow (in Russian), in *Proceedings of III Russian National Conference on Heat Transfer. Vol. 2. Forced Convection of Single-Phase Liquid*, Moscow: MPEI Publisher, 2002, p. 79.

- *Berezhnaya, O.K. and Efimov, A.L.*, Calculation of Developed Turbulent Flow and Heat Transfer Using a Model of Discontinuous Sublayer (in Russian), in Proceedings of III Russian National Conference on Heat Transfer. Vol. 2. Forced Convection of Single-Phase Liquid, Moscow. MPEI Publisher, 2002, p. 60.
- *Pavlov, Yu.M. and Zakharov, S.V.*, The Crisis of Nucleate Boiling of Liquids in Channels (physical model, calculation procedure) (in Russian), in Proceedings of III Russian National Conference on Heat Transfer. Vol. 1. Plenary and General Key Reports, Moscow. MPEI Publisher, 2002, p. 88.
- *Zakharov, S.V. and Pavlov, Yu.M.*, Critical Boiling of Saturated Liquids in Channels at High Pressures (in Russian), in Proceedings of III Russian National Conference on Heat Transfer. Vol. 4. Boiling, Boiling Crises, Post-Critical Heat Transfer, Moscow. MPEI Publisher, 2002, p. 103.
- *Garyaev, A.B.*, A Model of Propagation of Passive Impurity in a Free Turbulent Flow (in Russian), in Proceedings of III Russian National Conference on Heat Transfer. Vol. 5. Dispersed Flows and Porous Media, Moscow. MPEI Publisher, 2002, p. 191.
- *Kosenkov, V.I. and Synkov, I.V.*, Refining the Calculation Procedure for Plate Heat Exchangers (in Russian), in Proceedings of III Russian National Conference on Heat Transfer. Vol. 6. Enhancement of Heat Transfer, Moscow. MPEI Publisher, 2002, p. 130.
- *Danilov, O.L. and Shuvalov, S.Yu.*, The Use of Mathematical Models for the Assessment of the Potential of Energy Conservation (in Russian), in a collection of papers on The Problems Associated with Saving Fuel and Power at Cogeneration Plants and Enterprises, St. Petersburg. SPbGTU Publisher, 2001, p. 53.

## ■ **Dissertations**

- *Shuvalov, S.Yu.*, Power and Resource Saving by Directionally Affecting the Nonuniformity of the Thermal-Hydrodynamic Mode in Drying Dispersed Materials, Cand. Sci. (Tech.) Dissertation, 2002.
- *Krinitiskii, E.V.*, Raising the Energy Efficiency of Heat Exchangers with Intensifiers by Affecting the Local Characteristics, Cand. Sci. (Tech.) Dissertation, 2002.

## ■ **Partners**

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

## ■ **Unique Equipment**

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

Tel./Fax: (095) 362-7694  
E-mail: [Chemi-all@mpei.ru](mailto:Chemi-all@mpei.ru)

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.), Prof.

### ■ Main Lines of Research

#### Research supervisors

- Research and development of generators of hydrogen, oxygen, nitrogen, and other gases for uses in various spheres of industry, power engineering, and medicine  
Prof. N.V. Kuleshov
- Development of novel energy-intensive rechargeable current sources  
Prof. N.V. Korovin
- Systems 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
- Development of air-metal current sources  
Prof. N.V. Korovin
- 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 rechargeable cell
- Heat and mass transfer in electrochemical power plants
- Studying the processes in a facility utilizing a solar battery-lithium rechargeable cell system
- Rechargeable cell for an electric motor car
- Development of an electrolyzer for hydrogen-oxygen treatment of materials

## ■ Key Publications

- ❑ *Grigor'ev, S.A., Kuleshov, N.V., Fateev, V.N., and Khaliullin, M.M.*, Electrolysis of Water in a System with Solid Polymer Electrolyte under Pressure (in Russian), *Elektrokhimiya*, 2001, vol. 37, no. 8, p. 953.
- ❑ *Korovin, N.V.*, Electrochemical Power Plants: Current Status and Prospects (in Russian), *Elektrokhim. Energ.*, 2001, vol. 1, no. 4, p. 5.
- ❑ *Smirnov, S.E., Siling, S.A., Korovin, N.V., et al.*, Polymer Electrolytes for Lithium Sources of Current (in Russian), *Elektrokhimiya*, 2001, vol. 37, no. 9, p. 1143.
- ❑ *Ryzhenkov, V.A., Pogorelov, S.I., Kachalin, G.V. et al.*, Investigation of the Anti-corrosion Properties of Wear-Resistant Coatings for the Protection of Rotor Blades of Steam Turbines of High-Power Power-Generating Units (in Russian), *Vestnik MEI*, 2001, no. 5, p. 38.

## ■ Patents

- ❑ *Smirnov, S.E., Chebotarev, V.P., and Morgunov, D.A.*, Solid Polymer Electrolyte for Lithium Sources of Current, RF Patent no. 2, 190, 902, *Byull. Izobret.*, 2001, no. 28.

## ■ Partners

- ❑ Kurchatov Institute Russian Scientific Center (RNTs KI), 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

Tel.: (095) 362-7103, (095) 273-5071

Fax: (095) 918-1371

E-mail: [admin@stic-eett.ru](mailto:admin@stic-eett.ru);

[EM@mpei.ru](mailto:EM@mpei.ru)

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

Director of the Center:  
Anatolii G. VAKULKO  
Cand. Sci. (Tech.), Assoc. Prof.

### ■ Main Lines of Research

#### Research supervisors

- Scientific-and-methodic principles of energy conservation  
Assoc. Prof. A.G. Vakulko
- Methodology of developing information-and-analytical systems of energy conservation  
Assoc. Prof. A.V. Bobryakov
- Methodic principles of energy-related inspections (energy audit)  
Assoc. Prof. A.A. Zlobin
- Development of systems for monitoring the energy performance  
Sr. Researcher P.K. Makarychev
- Scientific principles of employing expander-generator units in systems of gas supply  
Sr. Researcher V.S. Agababov

### ■ Agreements, Contracts, Projects Supported by State Budget

- Development of software/hardware support of the activities of a standardized regional information center
- Compilation of software and relevant documentation to provide technical and managerial support for the development of an automatic system of energy efficiency based on most advanced computer technologies
- Development of a system of statistical accounting for the monitoring of energy demand
- Scientific-and-methodic support of a system of personnel refresher courses for the Ministry of Fuel and Energy and Ministry of Education
- Working out of recommendations for the compilation of energy certificates for enterprises and organizations
- Working out of methods for the development of regional information-and-analytical systems in the sphere of energy conservation
- Development of a system of centralized expert examination of projects in the sphere of energy conservation
- Development of a procedure of instrumental energy inspections of educational establishments involving the use of novel technical means
- Development of a system of monitoring and scientific supervision for Section 3.4 "Scientific-and-methodic development of energy conservation system in educational establishments" of the program of the Ministry of Education

- Development of a subsystem of “Accounting and monitoring of the consumption of fuel-and-energy resources by organizations financed from the Federal budget and control over the observation of the limits of consumption of fuel-and-energy resources by organizations financed from the budgets of subjects of the Russian Federation”
- Working out of “Recommendations for managerial, technical, and financial-and-economic mechanisms of raising the reliability and efficiency of heat supply”
- Working out of the conception of development of heat supply in Russia, including that of municipal power generation for the medium-term perspective
- Working out of methodic recommendations for implementing the section on “Energy efficiency of energy-intensive branches of industry” of the federal target-oriented program of “Energy-efficient economy”
- Working out of methodic and standard-and-technical documents for the preparation and realization of basic program measures and of the architecture and principles of functioning of an information-and-analytical system

## ■ Key Publications

- *Agababov, V.S., Koryagin, A.V., and Dzhuraeva, E.V.*, The Effect of an Expander-Generator Unit on the Thermal Efficiency of a Condensing Power Plant (in Russian), *Izv. Ross. Akad. Nauk*, 2002, no. 2, p. 54.
- *Agababov, V.S.*, The Features Characteristic of the Use of Expander-Generator Units in a Cogeneration Plant (in Russian), *Energoberezhenie i Vodopodgotovka*, 2002, no. 3, p. 27.
- *Agababov, V.S.*, Procedure of Estimating the Effect of an Expander-Generator Unit on the Thermal Efficiency of a Cogeneration Plant (in Russian), *Vestn. Mosk. Energ. Inst.*, 2002, no. 5, p. 48.
- *Agababov, V.S., and Koryagin, A.V.*, Determining the Energy Efficiency of Using an Expander-Generator Unit in Systems of Gas Supply (in Russian), *Teploenergetika*, 2002, no. 12, p. 350.
- *Panfilov, V.A.*, Present-Day Stage in the Development of Methods and Means of Instrumental Audit (quick measurements and continuous monitoring) (in Russian), in *Energy Conservation—Theory and Practice: A Collection of Scientific-and-Technical and Methodic Papers and Reports*, Moscow. Amipress Publisher, 2002, Part 2.
- *Vakulko, A.G.*, The System for Training and Improving the Skills of Specialists in the Sphere of Energy Management and Energy Efficiency in Russia (in Russian), in *IV All-Russia Scientific-and-Practical Conference (exhibition) on Energy Conservation in Russian Regions—2002*, Moscow, 2002.
- *Bobryakov, A.V.*, Presentation of a Collection of Papers on “Nonconventional Renewable Sources of Energy” (in Russian), in *The Sixth All-Russia Conference on Regional Problems in Energy Conservation and Ways for Their Solution*, Nizhnii Novgorod, 2002.
- *Vakulko, A.G., and Bobryakov, A.V.*, Development of an Information-and-Analytical System for Accounting and Monitoring of the Consumption of Fuel-and-Energy Resources for Departments of Education of Subjects of the Russian Federation (in Russian), in *The Sixth All-Russia Conference on Regional Problems in Energy Conservation and Ways for Their Solution*, Nizhnii Novgorod, 2002.
- *Klimenko, A.V., Vakulko, A.G., and Bobryakov, A.V.*, Information-and-Analytical Systems: Architecture, Structure, Application (in Russian), in *Energy Conservation—Theory and Practice: A Collection of Scientific-and-Technical and Methodic Papers and Reports*, Moscow. Amipress Publisher, 2002, Part 2.

- ❑ *Klimenko, A.V., Vakulko, A.G., and Bobryakov, A.V.*, Development of the Functional Capabilities of an Information-and-Analytical System for Accounting and Monitoring of the Consumption of Fuel-and-Energy Resources (in Russian), in Modern Educational Environment: Abstracts of Papers to the All-Russia Scientific Conference, Moscow, 2002.
- ❑ *Balykhin, G.A., Shlenov, Yu.V., Sergeev, S.K. et al.*, Realization and Operating Experience of the Information-and-Analytical System for Accounting and Monitoring of the Consumption of Fuel-and-Energy Resources of the Russian Ministry of Education "Conservation of Energy and Resources—XXI Century (in Russian), in Proceedings of II Regional Scientific-and-Practical Conference on Conservation of Energy and Resources—XXI Century at the Orel Regional Center for Energy Conservation, Orel, 2002.
- ❑ *Bobryakov, A.V., Masaleva, I.B., and Vorob'ev, A.S.*, The Information-and-Analytical System for Accounting and Monitoring of the Consumption of Fuel-and-Energy Resources of the Russian Ministry of Education: Modeling and Analysis (in Russian), in Information Means and Technologies: Abstracts of Papers to the International Conference, Moscow. Yanus-K Publisher, 2002, vol. 2, p. 152.
- ❑ *Bobryakov, A.V., Fedulov, A.S., Gavrilov, A.I., and Tikhonov, V.A.*, The Procedure for Designing an Information-and-Analytical System for Agencies of the State Energy Inspection (in Russian), in Information Means and Technologies: Abstracts of Papers to the International Conference, Moscow. Yanus-K Publisher, 2002, vol. 2, p. 156.
- ❑ *Vakulko, A.G., Zlobin, A.A., and Romanov, G.A.*, Problems of Pricing in Performing Energy Inspections (in Russian), in Scientific-and-Practical Conference on the Economics of Energy Conservation: A Collection of Papers and Presentations, Moscow. MAI Publisher (Moscow Aviation Inst.), 2002, p. 51.
- ❑ *Vakulko, A.G. and Zlobin, A.A.*, Energy Inspections as a First Step toward Efficient Utilization of Energy Resources (in Russian), *Energoberezhenie: A Specialized Journal*, 2001, no. 1.
- ❑ *Zlobin, A.A., Romanov, G.A., Karasev, Yu.A. et al.*, Energy Audit as an Essential Element of the Policy of Energy Conservation (in Russian), in *Energy Inspection and Energy Conservation Today: A Specialized Issue*, 2001, p. 48.

## ■ **Partners**

- ❑ Department of State Energy Inspection and Energy Conservation of the Russian Ministry of Energy, Moscow
- ❑ Directorate of Materials-and-Equipment Supplies of the Russian Ministry of Education, Moscow
- ❑ Economic Directorate of the Russian Ministry of Education, Moscow
- ❑ Directorate of State Energy Inspection for the City of Moscow (Mosgosenergonadzor), Moscow
- ❑ Ministry of Science and Industry of the Russian Federation, Moscow
- ❑ OAO Russkii aluminii—upravlyayushchaya kompaniya (Russian Aluminum—Managing Company), Moscow
- ❑ OOO Gazpromenergo company, Moscow
- ❑ OOO Orenburggazprom company, Orenburg
- ❑ JSC Mosenergo, Moscow
- ❑ MGUP Mosvodokanal water supply company, Moscow
- ❑ Central Bank of Russia, Moscow

## ■ **Unique Equipment**

- ▣ «Energoavtobus» MPEI (Energy Bus of Moscow Power Engineering Institute) — a collection of measuring-and-computer complexes and instruments for performing instrumental inspections of municipal services and industrial enterprises
- ▣ Integrated equipment for performing energy-and-environmental inspections and energy audits, including energy demand, quality of electricity, flowmeters for fuel-and-energy resources, meters of gas concentration for CO, CO<sub>2</sub>, SO<sub>8</sub>, NO<sub>x</sub>, O<sub>2</sub>, benzpyrene, etc.
- ▣ Software/hardware complex of the information-and-analytical system of the Russian Ministry of Education
- ▣ Software/hardware complex of the information-and-analytical system of agencies of State Energy Inspection of the Russian Ministry of Energy

Tel.: (095) 362-7127, (095) 362-7037

Fax: (095) 362-7037

E-mail: [gepl@deans.mpei.ac.ru](mailto:gepl@deans.mpei.ac.ru)

Internet address: [gepl.narod.ru](http://gepl.narod.ru)

The laboratory has on its staff  
5 research workers  
and 1 Ph.D. student

Head of Laboratory:  
Vladimir V. KLIMENKO  
Dr. Sci. (Tech.), Prof.

## ■ **Main Lines of Research**

- ❑ Investigation of the regularities of world power development
- ❑ Study of the environmental aspects of the development of various spheres of human activities, in particular, the evolution of environmental-protection 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 emission of greenhouse gases and pollutants in various branches of the world and Russian economy, development of scenarios of possible man's impact on the chemical and radiation-and-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 levels, in particular, the 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 concrete economy spheres (electrical power generation, systems of heat supply, objects of atomic industry, construction sites), development of new approaches to minimizing the negative consequences of the expected changes of natural environment and climate for the Russian economy
- ❑ Investigation of climates of the past and their relation to the evolution of civilization: paleoclimatic investigations (reconstruction of climates of the past using palynological, dendrochronological and other methods), historical climatology (reconstruction of climates of the past based on the study of historical documents)

## ■ **Agreements, Contracts, Projects Supported by State Budget**

- ❑ Development of methods for the estimation of the anthropogenic emission of methane and nitrous oxide in the territory of Russia
- ❑ Assessment of the harmful emissions reduction potential in power generation as a result of development of nonconventional and renewable energy sources
- ❑ Prospects of Russia's power industry as regards the execution of Kyoto Protocol decisions
- ❑ Assessment of anthropogenic emissions of greenhouse gases and pollutants in the territory of former USSR during the period of 1950-2000
- ❑ Power generation and expected changes of climate. Short-period factors and long-term tendencies
- ❑ Power generation and expected changes of climate. Regional trends and climatic characteristics

- ❑ Investigation of climatic aspects of the reliability of atomic industry objects in the territory of Russia
- ❑ Development of methods of changes prognostic estimation in the natural environment and climate in the territories of burial of radioactive waste
- ❑ Making 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

## ■ Key Publications

- ❑ *Klimenko, V.V., Klimanov, V.A., Sirin, A.A., and Sleptsov, A.M.*, Changes of Climate in the West of the European Part of Russia in Neoholocene (in Russian), Dokl. Ross. Akad. Nauk, 2001, vol. 376, no. 5, p. 679.
- ❑ *Klimenko, V.V.*, Global Warming and Power Generation: Myths and Reality (in Russian), Energiya, 2001, no. 5, p. 16.
- ❑ *Klimenko, V.V., Klimenko, A.V., and Tereshin, A.G.*, Power Generation and Climate at the Turn of the Century: Forecasts and Reality (in Russian), Teploenergetika, 2001, no. 10, p. 61.
- ❑ *Klimenko, V.V.*, The Climate of the Medieval Warm Epoch in the Northern Hemisphere (in Russian), Moscow. MPEI Publisher, 2001.
- ❑ *Klimenko, V.V., Mikushina, O.V., and Dovgalyuk, V.V.*, Prediction of Changes in the Climate of the Moscow Region under the Effect of Anthropogenic and Natural Factors (in Russian), Vestn. Mosk. Energ. Inst., 2001, no. 2, p. 36.
- ❑ *Klimenko, V.V.*, Monitoring of the Dynamics of Global Climatic Processes (in Russian), in Proceedings of the International Conference on the Mathematical and Physical Methods in Ecology and Environmental Monitoring, Moscow. MGUL Publisher, 2001, p. 43.
- ❑ *Tereshin, A.G.*, Environmental Aspects of Realization of the Energy Strategy of Russia (in Russian), Vestn. Mosk. Energ. Inst., 2001, no. 5, p. 72.
- ❑ *Klimenko, V.V., and Mikushina, O.V.*, The Variation of the Natural-and-Climatic Situation in the North of Russia in the first half of the XXI Century (in Russian), Energeticheskaya Politika, 2001, issue 5, p. 35.
- ❑ *Klimenko, V.V., Mikushina, O.V., and Larin, D.A.*, Temperature Trends of the Taimyr Region under Conditions of Global Change of Climate (in Russian), Geoekologiya, 2001, no. 3, p. 195.
- ❑ *Klimenko, V.V., Klimenko, A.V., Tereshin, A.G., and Mikushina, O.V.*, Changes in the Parameters of the Heating Season in the European Part of Russia as a Result of Global Warming (in Russian), Izv. Ross. Akad. Nauk Ser. Energ., 2002, no. 2, p. 10.
- ❑ *Klimenko, V.V., Klimenko, A.V., Tereshin, A.G., and Beznosova, D.S.*, The Russian Power Industry and the Protocol of Kyoto: Problems and Prospects (in Russian), in Proceedings of the International Scientific-and-Practical Conference on the Theoretical and Practical Problems of Development of Electrical Power Generation of Russia, St. Petersburg. SPbGTU Publisher (St. Petersburg State Technical Univ.), 2002, p. 73.
- ❑ *Klimenko, V.V., Tereshin, A.G., and Mikushina, O.V.*, Inclusion of Changes in the Climatic Parameters in Long-Term Planning of Development of Heat Supply (in Russian), Novosti Teplosnabzheniya, 2002, no. 2, p. 50.

## ■ Dissertations

- ❑ *Sleptsov, A.M.*, Development of Methods for Analysis and Generalization of Paleoclimatic Data (the history of the climate of Eastern Europe for the last two millennia), Cand. Sci. (Tech.) Dissertation, 2002.

## ■ 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, Münster, Germany
- ▣ Rhine University, Bonn, Germany
- ▣ Alexander von Humboldt Foundation, Bonn, Germany

# INSTITUTE OF ELECTRICAL ENGINEERING

## Director of the Institute

**Vitalii A. FILIKOV**  
**Cand. Sci. (Tech.), Prof.,**  
**Member of the Russian Academy**  
**of Electrical Engineering**

**Tel.: (095) 362-7105**

**Tel./Fax: (095) 273-3231**

**E-mail: [IETDIR-all@mpei.ru](mailto:IETDIR-all@mpei.ru)**

**[IETDIR@mpei.ru](mailto:IETDIR@mpei.ru)**

## Departments of the Institute

- **Department of Electromechanics ..... 4.2**
- **Department of Physics of Electrotechnical materials  
and Components and of Automation of  
Electrical-Technology Complexes ..... 4.5**
- **Department of Electrotechnical Complexes  
of Self-Contained Objects ..... 4.8**
- **Department of Electrical and Electronic Apparatuses ..... 4.10**
- **Department of Ecology Engineering  
and Protection of Labor ..... 4.12**
- **Department of Engineering Management ..... 4.15**
- **Department of Automated Electric Drive ..... 4.17**
- **Department of Electric Transport ..... 4.20**
- **Department of Power Supply of Industrial Enterprises ..... 4.24**

Tel.: (095) 362-7269, (095) 362-7189, (095) 362-7098

Fax: (095) 362-7269

E-mail: [EM-all@mpei.ru](mailto:EM-all@mpei.ru); [EM@mpei.ru](mailto:EM@mpei.ru)

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

Head of Department:  
Vyacheslav A. KUZNETSOV  
Dr. Sci. (Tech.), Prof.,  
Member of the International Academy  
of Electrical Engineering

### ■ Main Lines of Research

#### Research supervisors

- Development of controlled electrical machines and control systems for such machines  
Prof. V.A. Kuznetsov
- Research and development of the theory and methods for the calculation of magnetic fields in electrical machines  
Prof. A.V. Ivanov-Smolenskii
- Development of methods for the calculation and design of electrical machines under static and dynamic operating conditions  
Prof. V.Ya. Bespalov
- Development of CAD systems of low-power electrical machines  
Asst. Prof. G.A. Semenchukov
- Development of high-speed semiconductor voltage stabilizers  
Sr. Researcher B.N. Sergeenkov
- Improvements in the methods of calculation and design of synchronous micromachines  
Prof. I.L. Osin

### ■ Agreements, Contracts, Projects Supported by State Budget

- Methods of designing ac machines based on the theory of magnetic field in electrical machines
- Systems of CAD of general-purpose industrial and special-purpose electrical machines
- Preparation of design documentation for supply sources for 1—4 kW xenon lamps
- Research and development of a switched-reluctance electric drive
- Development of resource-conserving electromechanical converters
- Investigation of linear induction electric motors

### ■ Key Publications

- *Kopylov, I.P.*, Helioelectromechanics (in Russian), Moscow, MPEI Publishers
- *Lopukhina, E.M. and Zakharenko, A.B.*, Generation of Ideas and Engineering (in Russian), Moscow: Informelektro, 2002.

- ▣ *Abramov, A.I. and Ivanov-Smolenskii, A.V.*, Design of Turbogenerators and Synchronous Compensators (in Russian), Moscow: Vysshaya Shkola, 2002 (2<sup>nd</sup> ed.).
- ▣ *Osin, I.L. and Yuferov, F.M.*, Electrical Machines of Automatic Devices (in Russian), Moscow, MPEI Publishers, 2002.
- ▣ *Kopylov, I.P.*, Electrical Machines: A textbook for institutions of higher education (in Russian), Moscow: Vysshaya Shkola, 2002, 3<sup>rd</sup> ed.
- ▣ *Kopylov, I.P., Klovov, B.K., Morozkin, V.P., and Tokarev, P.F.*, Electrical Machine Design: A textbook for institutions of higher education (in Russian), Moscow: Vysshaya Shkola, 2002, 3<sup>rd</sup> ed.
- ▣ *Lopukhina, E.M. and Semenchukov, G.A.*, Automated Design of Low-Power Electrical Machines (in Russian), Moscow: Vysshaya Shkola, 2002.
- ▣ *Bespalov, V.Ya., Moshchinskii, Yu.A., and Petrov, A.P.*, A Mathematical Model of Asynchronous Motor in Generalized Orthogonal Coordinates, *Elektrichestvo*, 2002, no. 8, p. 33.
- ▣ *Lopukhina, E.M., Osin, I.L., Semenchukov, G.A., Sentyurikhin, N.I., et al.*, The Origination, Development, and Perspectives of Research into Low-Power Electrical Machines in the Department of Electromechanics of MPEI (Moscow Power Engineering Institute), *Elektrotehnika*, 2002, no. 10, p. 6.
- ▣ *Kuznetsov, V.A.*, The Jubilee of the Department of Electromechanics of MPEI (Moscow Power Engineering Institute), *Elektrichestvo*, 2002, no. 10, p. 50.
- ▣ *Kopylov, I.P.*, Electromechanics of Solar System, *Elektrotehnika*, 2002, no. 10, p. 50.
- ▣ *Ivanov, A.V., Merenko, D.V., Semenchukov, G.A., Sentyurikhin, N.I., et al.*, High-Reliability Asynchronous Capacitor Motors, *Elektrotehnika*, 2002, no. 8, p. 14.
- ▣ *Kopylov, I.P., Sonin, Yu.P., and Gulyaev, A.K.*, Orthogonally-Controlled Asynchronized Thyatron Motor, *Elektrotehnika*, 2002, no. 9, p. 2.
- ▣ *Lopukhina, E.M. and Merenkov, D.V.*, Experiments in Creative Development, *Vysshee Obrazovanie v Rossii*, 2002, no. 2, p. 118.
- ▣ *Bespalov, V.Ya.*, Ways of Improving Medium- and Low-Power Electrical Machines, in *Proceedings of Elmash-2002 International Symposium*, Moscow, 2002, p. 3.
- ▣ *Bespalov, V.Ya., Kiryakin, A.Ya., and Moshchinskii, Yu.A.*, Mathematical Simulation of Losses in the Steel of Asynchronous Motors of Electric Pumps Operating in Conjunction with Electronic Converters, in *Proceedings of Elmash-2002 International Symposium*, Moscow, 2002.
- ▣ *Kuznetsov, V.A. and Kuz'michev, V.A.*, Prospective Uses of Thyatron-Inductor Motors in Power Generation, in *Proceedings of Elmash-2002 International Symposium*, Moscow, 2002, p. 37.
- ▣ *Bespalov, V.Ya.*, An Efficient Scheme of Single-Phase Adjustable AC Electrical Drive, in *Proceedings of Second All-Russia Scientific-and-Practical Conference on Systems of Control over Electrotechnical Objects*, Tula, 2002, p. 12.
- ▣ *Kuzumichov, V.A., Kuznetsov, V.A., and Kisselyov, S.E.*, Analysis of 3-Phase 12/4-Switched Reluctance Motor with Asymmetrical Magnetic System, in *Proc. Summer Seminar of Nordic Seminar Network for Multi Disciplinary Optimized Electric Drives*, 15–17 June, 2002, Taipalsaari, Finland.
- ▣ *Kuzumichov, V., Matveev, A., and Lomonova, E.*, New Comprehensive Approach to Estimation of End Effects in Switched Reluctance Motor, in *Proc. Int. Conf. on Electrical Machines ICEM-2002*, August 2002, Bruges, Belgium.

## Partners

- ▣ Scientific-and-Production Enterprise All-Russia Research Institute of Electromechanics (NPP VNIIEM), Moscow

- ▣ Elektrosila Company, St. Petersburg
- ▣ All-Russia Research and Design-and-Technology Institute of Electrical Machine Engineering (VNIPTIEM), Vladimir
- ▣ Yaroslavl Electromechanical Works, Yaroslavl
- ▣ Ford Motor Company, Detroit, USA
- ▣ Crosna Company, Moscow
- ▣ Norwegian University of Science and Technology, Trondheim, Norway
- ▣ Technical University, Sofia, Bulgaria
- ▣ University of Calgary, Calgary, Canada
- ▣ Wisconsin-Madison University, Madison, USA
- ▣ University of Punta Arenas, Punta Arenas, Chile
- ▣ San Sebastian University, Arequipa, Peru
- ▣ Tsinghua University, Beijing, People's Republic of China
- ▣ Dong Fong Works, People's Republic of China

# DEPARTMENT OF PHYSICS OF ELECTROTECHNICAL MATERIALS AND COMPONENTS AND OF AUTOMATION OF ELECTRICAL-TECHNOLOGY COMPLEXES

Tel.: (095) 362-7858, (095) 362-7193

Fax: (095) 273-3231

E-mail: [FTETMK-all@mpei.ru](mailto:FTETMK-all@mpei.ru)

[FTETMK@mpei.ru](mailto:FTETMK@mpei.ru)

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

Head of Department:  
Vitalii A. FILIKOV  
Cand. Sci. (Tech.), Prof.,  
Member of the Russian Academy  
of Electrical Engineering

## ■ Main Lines of Research

### Research supervisors

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

## ■ Agreements, Contracts, Projects Supported by State Budget

- Development of radio-wave absorbing coatings

- ❑ Development of process equipment for crucibleless zone melting with radiation heating
- ❑ Development of high-quality electric-grade ceramics
- ❑ Elaboration of a set of educational methods related to electrotechnical materials for public education
- ❑ Investigation and optimization of controlled power supply for plasmatron
- ❑ Investigation of the effect of electrical-technology processes on the environment and reduction of their negative impact
- ❑ Investigation of the operation modes of induction technological facilities
- ❑ Investigation of the technology of conducting coatings vacuum deposition

## ■ Key Publications

- ❑ *Kruczinin, A.M., Sawicki, A.*, Piece i urządzenia plazmowe. Cz.1. Piece i urządzenia plazmowe ciśnienia atmosferycznego (in Poland), Częstochowa: Wydawnictwo Politechniki, 2001.
- ❑ *Kruczinin, A.M., Sawicki, A.*, Piece i urządzenia plazmowe. Cz.2. Piece plazmowo-prozniowe i właściwości elektrod plazmotronów (in Poland), Częstochowa: Wydawnictwo Politechniki, 2001.
- ❑ *Tikhonov, A.I.*, Dynamic HTML (in Russian), Moscow: Binom Publisher, 2001.
- ❑ *Denisov, G.A., Gur'ev, V.V., Kuvaldin, A.B., and Neproshin, E.I.*, Production of Ultrafine Fiber: Technologies and Equipment, Elektrometallurgiya, 2001, no. 4, p. 28.
- ❑ *Dmitriev, I.Yu., Mineev, A.R., and Rubtsov, V.P.*, Improvements in the Operation of High- Precision Arc Facilities for Processing Pipes by Integrated Methods, Elektrometallurgiya, 2001, no. 11, p. 26.
- ❑ *Kuvaldin, A.B.*, The Effect of Variable Electromagnetic Field on the Personnel of Power Plants of Industrial Enterprises (a review), Elektrometallurgiya, 2002, no. 3, p. 33.
- ❑ *Kuvaldin, A.B. and Lepeshkin, A.R.*, High-Rate Induction Heating of Cylindrical Metal Blanks with Due Regard for Thermal Stresses and Elastoplastic Properties, Elektrichestvo, 2002, no. 6, p. 30.
- ❑ *Kuvaldin, A.B. and Rashevskaya, M.A.*, Designing Induction Melting Furnaces as a Part of Educational Training, Elektrometallurgiya, 2002, no. 7, p. 40.
- ❑ *Dolbilin, E.V.*, Thermochemical Treatment of Metals in a Pulsed Electric Discharge, Vestnik MEI., 2002, no. 2, p. 44.
- ❑ *Rubtsov, V.P., Emel'yanov, A.L., and Savalyk, N.A.*, Ensuring the Uniformity in the Process of Electron-Beam Deposition of Coatings on Roll Materials, Vestnik MEI., 2002, no. 3, p. 66.

## ■ Dissertations

- ❑ *Pogrebisskii, M.Ya.*, Development of Methods and Systems of Temperature Control for Resistance Furnaces Characterized by Improved Energy Performance, Cand. Sci. (Tech.) Dissertation, 2001.
- ❑ *Dolbilin, E.V.*, Development of Theoretical Principles and Electrical Equipment for Thermochemical Treatment of Articles in an Electric Discharge at Atmospheric Pressure, Dr. Sci. (Tech.) Dissertation, 2002.
- ❑ *Kuznetsov, D.V.*, Development of Induction Devices with Two-Layer Arrangement of Inducing Conductors for Heating Flat Metal Articles in a Transverse Magnetic Field, Cand. Sci. (Tech.) Dissertation, 2001.

- *Dmitriev, I.Yu.*, Development of Energy- and Resource-Conserving Methods of Plasma Treatment of Pipes, Cand. Sci. (Tech.) Dissertation, 2002.

## ■ **Patents**

- *Kuvaldin, A.B. and Lepeshkin, A.R.*, A Method of Induction Heating of Metal Articles and a Device for Its Realization, RF Patent no. 2,167,502, Byull. Izobret., 2001, no. 14.
- *Kuvaldin, A.B., Dolbilin, E.V., and Chursin, A.Yu.*, A Method of Thermochemical Treatment of Articles and a Device for Its Realization, RF Patent no. 2,175,817, Byull. Izobret., 2001, no. 31.
- *Kuvaldin, A.B., Lepeshkin, A.R., and Lepeshkin, S.A.*, A High Frequency Inverter, RF Utility Model Certificate no. 19,977, Byull. Izobret., 2001, no. 28.
- *Boiko, F.K., Gamazin, S.A., Kuvaldin, A.B., et al.*, A Method of Improving the Efficiency of Electrical Sources of Light, Provisional Kazakhstan Patent no. 10,246, Byull. Izobret., 2001, no. 5.
- *Kuvaldin, A.B. and Zakharov, I.V.*, A Multilayer Inductor Winding, Provisional Kazakhstan Patent no. 9858, Byull. Izobret., 2001, no. 1.
- *Kislov, A.P., Kuvaldin, A.B., Novozhilov, A.N., et al.*, A Device for Induction Heating, Provisional Kazakhstan Patent no. 10,706, Byull. Izobret., 2001, no. 9.
- *Denisov, G.A., Gur'ev, V.V., Neproshin, E.I., et al.*, A Device for the Melting of Oxides, RF Patent no. 2,184,088, Byull. Izobret., 2002, no. 18.
- *Kuvaldin, A.B. and Kuznetsov, D.A.*, An Induction Device for Heating Thin Metal Articles, RF Utility Model Certificate no. 25,970, Byull. Izobret., 2002, no. 30.

## ■ **Partners**

- Institute of Electronics, Bulgarian Academy of Sciences, Sofia, Bulgaria
- Czestochowa Polytechnic University, Czestochowa, Poland
- Technical University of Ilmenau, Germany
- Tuyang University of Technology, Tuyang, 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 (VNIETO), 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

Tel.: (095) 362-7100

Fax: (095) 362-7777

E-mail: [ecao@ecio.mpei.ac.ru](mailto:ecao@ecio.mpei.ac.ru)

The department has on its staff  
15 lecturers,  
23 research workers,  
and 10 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
- Automation of research and development associated with 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  
Sr. Researcher A.M. Rusakov
- Thyatron electric drives highly adaptable to manufacture for use with industrial and household mechanisms  
Prof. V.I. Nagaitsev, Sr. Researcher A.M. Santalov

## ■ 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, microcryogenic 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

- Development of electromechanical systems on the basis of synchronous motors with controlled magnetic excitation

## ■ **Key Publications**

- *Electrotechnical Complexes* of Self-Contained Objects: A Collection of Papers (in Russian)), Moscow: MPEI Publishers, 2001.
- *Tyrichev, P.A.*, Control-and-Measuring Elements and Devices of the Data Channel of Electromechanical Systems), Moscow: MPEI Publishers, 2001.
- *Lipai, B.R. and Maslov, S.I.*, Computer Models of Electromechanical Systems (in Russian), Moscow: MPEI Publishers, 2002.
- *Eremenko, V.G. and Solomin, A.N.*, The Principles of Construction of Energy Converters (in Russian), Moscow: MPEI Publishers, 2002.

## **Dissertations**

- *Mytsyk, G.S.*, The Methodology of Structure and Algorithm Synthesis and Analysis of Non-Distorting Power-Electronic Devices for Electrotechnical Complexes of Self-Contained Objects, Dr. Sci. (Tech.) Dissertation, Moscow, 2001.

## ■ **Partners**

- State Research Institute of Systems Integration, Moscow
- Moscow Ordzhonikidze State Aviation Institute (MGAI), 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, a public corporation, Moscow
- Aviation Electronics and Communication Systems, a public corporation, Moscow
- TSENTROTEKH-EKhZ Scientific-and-Technical Center, St. Petersburg
- Federal State Unitary Enterprise "Prozhektor Leading Experimental Design Bureau", Moscow
- Yakor' Experimental Design Bureau, Moscow

## ■ **Unique Equipment**

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

Tel.: (095) 362-7004  
Tel./Fax: (095) 362-7835  
E-mail: [eea-all@mpei.ru](mailto:eea-all@mpei.ru)  
[EEA@mpei.ru](mailto:EEA@mpei.ru)

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

Head of Department:  
Yurii K. ROZANOV  
Dr. Sci. (Tech.), Prof.,  
Member of the Russian Academy  
of Electrical Engineering,  
Vice President,  
Association of Power Electronic Engineers

### ■ 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 quality of power for power supply systems  
Prof. Yu.K. Rozanov, Asst. Prof. M.V. Ryabchitskii
- Research and development of systems with electromechanical and power electronic control on the basis of microprocessors and microelectronics  
Asst. Lecturer 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 designed 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 theory of control and commutation of electrical power flows by means of modern power electronics
- Research and development of the principles of construction of modular systems of independent power supply of 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 technology of manufacture of liquid-metal contact units, which offer a higher reliability and lower consumption of materials and power
- ❑ Elaboration of the fundamentals of the theory of control of 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 methods of analysis and design of electromagnetic vibration units for enhancement of oil and gas-condensate recovery

## ■ 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

Tel.: (095) 362-7246

Fax: (095) 273-7770

E-mail: [ecology@mpei-14.mpei.ac.ru](mailto:ecology@mpei-14.mpei.ac.ru)

The department has on its staff  
21 lecturers, 6 research workers,  
and 4 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
- Geoinformation technologies in environmental monitoring  
Assoc. Prof. T.N. Maslova
- Electrical safety  
Prof. V.T. Medvedev, Assoc. Prof. S.G. Novikov
- Electromagnetic compatibility  
Prof. E.S. Kolechitskii
- Research and development of diagnostic systems of bronchial-and-pulmonary diseases  
Prof. V.T. Medvedev, Assoc. 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, Assoc. Prof. S.G. Novikov
- Research and development of automated systems of monitoring and control over 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 effect of electrical-technology processes on the environment and the development of the principles of reduction of their negative effect
- Development of procedures for energy-oriented monitoring of power supply systems of educational institutions
- Preparation of the section on Electrical Safety of the set of educational training methods on the subject of Safety of Vital Activities for regional centers of the system of public education
- 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 infra-red radiators
- Basic research and development of methods of reducing the vibroacoustic parameters of electrical machines for high-voltage objects
- Investigation of problems associated with the development and realization of 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 the levels of dangerous and harmful production factors characteristic of workplaces equipped with computers for their certification, and development of recommendations for reducing these levels

## ■ Key Publications

- *Medvedev, V.T., Monakhov, A.F., et al.*, Safety Rules in Servicing Hydraulic Structures and Hydromechanical Equipment of Power Supply Facilities (in Russian), Moscow: NTs ENAS, 2001.
- *Environmental Engineering: A Textbook*, Medvedev, V.T., Ed., Moscow: Gardariki, 2002.
- *Borisov, R.K., Balashov, V.V., Zharkov, Yu.V., et al.*, Grounding Electrodes of High-Voltage Substations: Present-Day Problems and Ways of Solving Them, Elektrichestvo, 2001, no. 7.
- *Medvedev, V.T.*, The System of Environmental Monitoring in the Educational Process and in Maintaining the Safety of Vital Activities, Bezopasnost' Zhiznedeyatel'nosti, 2001, no. 3.
- *Medvedev, V.T., Makal'skii, L.M., and Polyanskii, D.A.*, Energy-Ecology Inspection of Enterprises and Offices, TEK, 2001, no. 6.
- *Gonopol'skii, A.M. and Fedorov, L.G.*, Experience in Systems Analysis of Sanitary Cleaning of Towns of Solid Household Waste, Chisty Gorod, 2002, no. 1, p. 4.

## ■ Dissertations

- *Malyshev, V.S.*, Scientific Method of Data Processing in the Case of Acoustic Diagnostics of the Effect of Working Environment on Human Health, Dr. Sci. (Biol.) Dissertation, Tula, 2002.
- *Suzdaleva, A.L.*, The Structure and Environmental Status of Natural-Technogenic Systems of Cooling Ponds of Nuclear Power Plants, Dr. Sci. (Biol.) Dissertation, Moscow, 2002.

## ■ Partners

- Scientific-and-Production Association of Instrument Making for Space Applications, Moscow
- Research Institute of Pediatrics and Infant Surgery of the Ministry of Health of the Russian Federation, Moscow
- Section of Applied Problems at the Presidium of the Russian Academy of Sciences, Moscow
- Federal State Unitary Enterprise Armatura Design Bureau, Kovrov, 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 system of public education

Tel.: (095) 362-7474, (095) 362-7516

Fax: (095) 362-7757

E-mail: [Lozenko\\_VK@mpei.ru](mailto:Lozenko_VK@mpei.ru)

The department has on its staff

21 lecturers and

37 post-graduate 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, Moscow, 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 (Informelekto), 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, Hangchow, People's Republic of China
- ❑ Nilsbrok College, Copenhagen, Denmark
- ❑ Technical University, Gabrovo, Bulgaria

Tel.: (095) 362-7425  
 Fax: (095) 273-1348  
 E-mail: [AEP-all@mpei.ru](mailto:AEP-all@mpei.ru)  
[AEP@mpei.ru](mailto:AEP@mpei.ru)

The department has on its staff  
 25 lecturers,  
 30 research workers,  
 and 30 Ph.D. students

Head of Department:  
 Sergei K. KOZYREV  
 Cand. Sci. (Tech.), Prof.

### ■ Main Lines of Research

#### Research supervisors

- Development of control systems with the regulation of process parameters by means of electric drive  
 Prof. S.K. Kozyrev, Prof. O.I. Osipov
- Development of methods and technical means to provide for resource and energy saving by means of electric drive  
 Prof. N.F. Il'inskii, Assoc. Prof. A.N. Ladygin
- Development of methods and technical means of control for switched-reluctance electric drives  
 Prof. N.F. Il'inskii, Prof. M.G. Bychkov, Assoc. Prof. V.F. Kozachenko
- Development of advanced control systems for electric drives of excavating machines  
 Prof. L.M. Mironov
- Development of theoretical principles and systems of control for high-precision servodrives  
 Prof. V.M. Terekhov
- Development of precision two-channel electric drives employing piezo- and magnetostrictive motors  
 Chief Researcher A.A. Hicol'skii
- Development of efficient systems of induction-motor electric drive using thyristor voltage regulators  
 Prof. L.B. Masandilov, Assoc. Prof. V.A. Anisimov
- Development of systems for exact reproduction of motion using multicoordinate step electric drives  
 Sr. Researcher A.P. Balkovoi
- Development of universal microprocessor controllers employing novel circuit elements for electric drives  
 Assoc. Prof. V.F. Kozachenko
- Procedural and technical support of electric drive testing  
 Assoc. Prof. Yu.N. Sergievskii
- Development of frequency-controlled electric drives employing up-to-date circuit elements  
 Chief Researcher A.V. Kudryavtsev, Assoc. Prof. V.N. Ostirov

## ■ Agreements, Contracts, Projects Supported by State Budget

- Comparative analysis and definition of prospects for developments in the field of electric drives and their components
- Development of design procedures and technical means of electric drive for energy- and resource-saving technologies
- Development of mechatron modules of motion with elements of artificial intelligence
- Development of advanced technical solutions of assembly-line controlled switched-reluctance electric drive
- Updating of the electric drive of a pumping plant, employing a complete energy- and resource-saving device with a frequency converter
- Elaboration of methods of development of object-oriented switched-reluctance electric drives
- Development of a controller for switched-reluctance electric drive
- Development and implementation of unified ac and dc electric drives for excavating machines
- Testing and certification of low-voltage complete devices, electronic converters, and electric motors
- Development and implementation of magnetostrictive electric drives of lathes for precision turning of automobile pistons
- Development of hybrid devices using a thyristor voltage controller for soft starting of induction-motor electric drives
- Development of a linear step electric drive design
- Development of a frequency-controlled induction motor electric drive with vector control
- Investigation of electromagnetic brake

## ■ Key Publications

- *Electric Drive and Control Systems*, Tr. Mosk. Energ. Inst., 2001, no. 677.
- *Electric Drive and Control Systems*, Tr. Mosk. Energ. Inst., 2001, no. 678.
- *The Use of Programmable Controllers in Industrial Plants* (in Russian), reports made at the scientific-and-practical seminar of the department, Moscow, MPEI Publishers, 2001.
- *DC Electric Drive: Current Status and Tendencies* (in Russian), reports made at the scientific-and-practical seminar of the department, Moscow, MPEI Publishers, 2002.
- *Klyuchev, V.I.*, *Electric Drive Theory: A Textbook* (in Russian), Moscow: Energoatomizdat, 2001.
- *Bolkovoi, A.P., Lutsenko, V.E., et al.*, Optimization of the Electromagnetic Structure of Linear Mechatron Modules, *Privodnaya Tekhnika*, 2001, no. 10, p. 36.
- *Klyuchev, V.I., Mironov, L.M., et al.*, Development of Microprocessor-Controlled Thyristor Converters for Excavating Machines, *Vestn. Mosk. Energ. Inst.*, 2001, no. 4, p. 51.
- *Terekhov, V.M.*, Algorithms of Fuzzy-Regulators in Electrotechnical Systems, *Elektrichestvo*, 2001, no. 12, p. 33.
- *Bychkov, M.G. et al.*, Investigation of Torque Ripples in a Switched-Reluctance Electric Drive, *Elektrichestvo*, 2001, no. 10, p. 33.
- *Kozachenko, V.F. and Chuev, P.V.*, Reduction of Distortions of the Output Voltage of an Inverter with Vector Pulse-Width Modulation, *Vestn. Mosk. Energ. Inst.*, 2002, no. 4, p. 43.

- ❑ *Kozachenko, V.F., Obukhov, N.A., et al.*, The Use of Texas Instruments KSP Microcontrollers in "Universal" Frequency Converters with a Vector Control System, *Elektron. Komponenty*, 2002, no. 4, p. 61.
- ❑ *Bogachenko, D.D., Kudryavtsev, A.V., Ladygin, A.N., et al.*, Control Systems for Energy-Saving Electric Drives of General-Purpose Industrial Mechanisms, *Elektrotehnika*, 2002, no. 5, p. 2.

## ■ Dissertations

- ❑ *Konakova, E.S.*, Development of Fuzzy Control Logic for Power Servodrives, Cand. Sci. (Tech.) Dissertation, 2001.
- ❑ *Chaika, D.V.*, Development of Optimal Algorithms of Control and Diagnostics for General-Purpose Industrial Frequency-Controlled Electric Drives, Cand. Sci. (Tech.) Dissertation, 2002.
- ❑ *Kuznetsov, A.S.*, Investigation and Development of Assembly-Line Induction-Motor Electric Drive for Rocker Machines, Cand. Sci. (Tech.) Dissertation, 2002.
- ❑ *Postnikov, S.G.*, Investigation and Development of Electric Drive Employing an Induction Motor with Separate Excitation, Cand. Sci. (Tech.) Dissertation, 2002.
- ❑ *Sarach, M.B.*, Development of the Control System for a Frequency Converter with Built-in Functions of Group Control of Equipment and Indirect Determination of Process Parameters, Cand. Sci. (Tech.) Dissertation, 2002.
- ❑ *Utkin, S.Yu.*, Development of Electronic Commutators for General-Purpose Switched-Reluctance Electric Drives, Cand. Sci. (Tech.) Dissertation, 2002.
- ❑ *Chuyev, P.V.*, Development of Vector Control Systems for Induction-Motor Drives Using Special-Purpose Signal Microcontrollers, Cand. Sci. (Tech.) Dissertation, 2002.
- ❑ *Trofimov, S.A.*, Development of Control Systems for Step and Switched-Reluctance Motors Using Special-Purpose Microcontrollers and Power Modules of New Generation, Cand. Sci. (Tech.) Dissertation, 2002.

## ■ Partners

- ❑ Elektroprivod Company, Moscow
- ❑ All-Russia Research Institute of Electromechanics (NPP VNIIEEM), Moscow
- ❑ Yaroslavl Electromechanical Works, Moscow
- ❑ Mosenergo Company (OZAP branch), Moscow
- ❑ Siemens Moscow Representation, Germany
- ❑ Schneider Electric Moscow Representation, France
- ❑ Fachhochschule of Kempten, Germany
- ❑ Technical University of Ilmenau, Germany

## ■ Unique Equipment

- ❑ Multipurpose test bed for testing converters, motors, and complete electric drives under conditions of normalized network and load parameters
- ❑ Thermal-and-moisture chamber with a device for vibration strength and vibration resistance testing
- ❑ Computerized test bed for automated testing of electric drives
- ❑ Computerized test bed for testing a dc thyristor drive with microprocessor control

Tel.: (095) 273-3371, (095) 362-7420

E-mail: [kaver@kaver.informatika.ru](mailto:kaver@kaver.informatika.ru)

The department has on its staff

15 lecturers,

19 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  
Prof. A.V. Safronov
- 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

- 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
- Raising the efficiency of energy conversion at traction substations of ground urban electric transport
- Development and reduction to manufacture of efficient electric drives employing induction motors for auxiliary needs of the rolling stock of urban electric transport
- Development of environmentally benign efficient electric drives based on collectorless ac machines using advanced semiconductor instruments
- Development of special-purpose electric equipment, assembly, testing, and assessment of energy performance of experimental section of ER2S electric train
- 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 power trucks
- 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)
- Development of a system for training specialists for foreign countries in Russian higher schools of engineering

## ■ Key Publications

- *Saburov, V.A.*, Amplitude-Phase Characteristics of DC Cable Lines, *Vestn. Mosk. Energ. Inst.*, 2001, no. 2, p. 26.
- *Glushenkov, V.A., Kaledin, A.A., Trepakov, M.A., and Komarov, V.G.*, Traction Drive for Trolley Bus with Independent Motion, in *Tezisy dokladov nauchno-prakticheskoi konferentsii "Transportnyi elektroprivod—2001"* (Abstracts of papers to the scientific-and practical conference on Transport Electric Drive—2001), *Elektrosila Works, St Petersburg*, 2001, p. 33.
- *Glushenkov, V.A. and Smerdov, G.A.*, The Traction Drive of Tatra-Yug Street Car, in *Tezisy dokladov nauchno-prakticheskoi konferentsii "Transportnyi elektroprivod—2001"* (Abstracts of papers to the scientific-and practical conference on Transport Electric Drive—2001), *Elektrosila Works, St Petersburg*, 2001, p. 33.
- *Tulupov, V.D., Kiryukhin, Yu.A., Marchenkov, A.P., et al.*, The Energy-Saving System of a DC Traction Electric Drive with the Optimal Technical-and-Economic and Operating Performance, in *Tezisy dokladov nauchno-prakticheskoi konferentsii "Transportnyi elektroprivod—2001"* (Abstracts of papers to the scientific-and practical conference on Transport Electric Drive—2001), *Elektrosila Works, St Petersburg*, 2001, p. 25.
- *Kolobov, M.G., Safronov, A.V., and Trofimenko, V.I.*, Investigation of Components of Semiconductor Converter for Compressor Drive, in *Tezisy dokladov nauchno-tehnicheskoi konferentsii "Sostoyanie, razrabotki i perspektivy primeneniya ventill'no-induktornykh privodov v promyshlennosti i na transporte"* (Abstracts of papers to the scientific-and-technical conference on The Status, Developments, and Prospects for Utilization of Switched-Reluctance Drives in Industry and Transport), *Moscow*, 2001.
- *Tulupov, V.D. and Bezrukov, T.V.*, Alternative Option of Overhaul-and-Reconditioning for Extension of the Service Life of ER2 Electric Trains, in *Tezisy dokladov IV nauchno-prakticheskoi konferentsii "Resursosberegayushchie tekhnologii na zheleznodorozhnom transporte"* (Abstracts of papers to the IV scientific-and-practical conference on Resource-Saving Technologies in Railroad Transport), *Moscow*, 2001, p. III-52.
- *Tulupov, V.D. and Kiryukhin, Yu.A.*, Assessment of Relative Efficiency of Using Traction Machines of Rated Voltage of 0.75 and 1.5 kV in Energy-Saving System of Traction Electric Drive of Electric Trains, in *Tezisy dokladov IV nauchno-prakticheskoi konferentsii "Resursosberegayushchie tekhnologii na zheleznodorozhnom transporte"* (Abstracts of papers to the IV scientific-and-practical conference on Resource-Saving Technologies in Railroad Transport), *Moscow*, 2001.
- *Sleptsov, M.A. and Shchurov, N.I.*, Methods and Means for Reducing the Loss of Electrical Power in a Subsystem of Electric Transport, *Vestn. Mosk. Energ. Inst.*, 2002, no. 5.
- *Sleptsov, M.A., Glushenkov, V.A., Safronov, A.V., et al.*, Electric Drive of Electrobus, in *Tezisy dokladov otchetnoi konferentsii-vystavki po podprogramme "Transport"* (Abstracts of papers to the summarizing conference-exhibition under the Transport subprogram), *Moscow: Izd. MEI (Moscow Inst. of Power Engineering)*, 2002, p. 183.

- *Tulupov, V.D.*, DC Traction Electric Drives Exhibiting the Optimal Technical and Economic Performance, *Elektrosila*, 2002, issue 41, p. 196.

## ■ Patents

- *Kaledin, A.A., Glushenkov, V.A., Safronov, A.V., et al.*, Transportation Technical System, RF Inventor's Certificate no. 20 064, *Byull. Izobret.*, 2001, no. 29.
- *Suslov, B.E., Trofimenko, V.I., and Khotsyanov, D.I.*, DC Electric Drive, RF Patent no. 2 168 258, *Byull. Izobret.*, 2001, no. 15.
- *Suslov, B.E., Trofimenko, V.I., and Khotsyanov, D.I.*, DC Electric Drive, RF Patent no. 2 168 259, *Byull. Izobret.*, 2001, no. 15.

## ■ Partners

- Dinamo Joint-Stock Electrotechnical Company, Moscow
- St Petersburg Trolley Bus Works, St. Petersburg
- Trolley Bus Works, Engels, Saratov Region, Russia
- Electrical Apparatus Works, Zaporozhye, 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 VEINII), 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

Tel.: (095) 362-7386, (095) 362-7074

E-mail: [ESPP-all@mpei.ru](mailto:ESPP-all@mpei.ru)

[ESPP@mpei.ru](mailto:ESPP@mpei.ru)

The department has on its staff  
17 lecturers,  
1 research worker,  
and 22 Ph.D. students

Head of Department:  
Stanislav I. GAMAZIN  
Dr. Sci. (Tech.), Prof.

## ■ Main Lines of Research

### Research supervisors

- Automation of theoretical and experimental investigations of transient processes in power supply systems of industrial enterprises  
Prof. S.I. Gamazin
- Determination and prediction of the parameters of electric power consumption for existing enterprises and for those under construction, with optimization of the structure of installed electric equipment and equipment under repair  
Prof. B.I. Kudrin
- Electromagnetic compatibility of high-power conversion devices with power supply systems of industrial enterprises  
Assoc.. Prof. I.G. Bure
- Electric power supply of consumers of industrial enterprises from independent supply sources  
Assos. Prof. I.M. Hevsuriani
- Control of electric power supply in supply systems of industrial enterprises  
Prof. E.A. Konyukhova

## ■ Agreements, Contracts, Projects Supported by State Budget

- Investigation of the general law and stability of development of the electrical equipment of industry
- Investigation of the regularities of functioning of systems of industrial power supply in the case of voltage dip
- Theoretical investigation and simulation of combination input filter in ac network
- Development of theoretical principles of the investigation of internal power supply of industrial enterprises
- Investigation of the theoretical foundations for the development of advanced methods of voltage control in the networks of industrial enterprises
- Investigation of the theoretical foundations for the development of no-break power supply to high-priority industrial consumers
- Working out technical decisions aimed at increasing the reliability of functioning of a high-voltage load at substations of NAK Azot
- Long-term planning of the scope of overhauling the electric equipment of NAK Azot for the purpose of reducing the capital cost

## ■ Key Publications

- ❑ *Konyukhova, E.A. and Kireeva, E.A.*, The Reliability of Power Supply of Industrial Enterprises (in Russian), Moscow: NTF Energoprogress, 2001.
- ❑ *Kudrin, B.I.*, The State Plan of Market-Oriented Electrification of Russia (GOREL) and the Concept of Energy Saving, *Elektrika*, 2001.
- ❑ *Kireeva, E.A.*, Raising the Reliability, Efficiency, and Safety of Systems of Shop Power Supply (in Russian), Moscow: NTF Energoprogress, 2002.
- ❑ *Kudrin, B.I.*, Organization, Structure, and Management of the Electric Equipment of Industrial Enterprises Using the Theory of Large Systems (in Russian), Moscow: Center of Systems Studies, 2002, issue 24.
- ❑ *Kireeva, E.A. and Grigor'ev, V.V.*, Reference Materials for Electric Equipment of Power Supply Systems of Industrial Enterprises (in Russian), Moscow: Energoatomizdat, 2002.
- ❑ *Antonov, I.M., Bure, I.G., Strikos, D., and Shevchenko, V.V.*, The Use of Computer Codes of Circuitry Simulation for the Calculation of the Modes of Three-Phase Power Circuits with Nonlinear Load, *Elektrichestvo*, 2001, no. 3, p. 43.
- ❑ *Shevchenko, V.V. and Gracheva, E.I.*, Determination of Electric Power Loss in Shop Networks with a Voltage of up to 1000 V, *Prom. Energ.*, 2001, no. 10, p. 33.
- ❑ *Nikiforova, V.N., Bello, S.B., Kartasida, N.Yu., et al.*, Experimental Investigation of the Nonsinusoidality of Voltage in Lenenergo Electrical Networks, *Prom. Energ.*, 2001, no. 8, p. 40.
- ❑ *Matyunina, Yu.V.*, The Third Scientific Picture of the World and the Energy Conservation, *Elektrichestvo*, 2001, no. 5, p. 40.
- ❑ *Kudrin, B.I.*, Electrics: Entering the Millennium, *Elektrika*, 2001, no. 1, p. 2.
- ❑ *Kudrin, B.I.*, What Does the Electrician Need a Rating for, *Elektrika*, 2001, no. 8, p. 3.
- ❑ *Kudrin, B.I.*, The History of Reactive Power Compensation: Remarks of the Editor-in-Chief, *Elektrika*, 2001, no. 6, p. 26.
- ❑ *Bystritskii, G.F. and Shilov, S.V.*, A Mini-Cogeneration Power Plant on the Basis of the Heating Boiler House of the Rubin Factory, *Elektrika*, 2001, no. 7, p. 23.
- ❑ *Shevchenko, V., Bure, I., Khevsuriani, I., et al.*, Combined Filter for Industrial Consumers Featuring Nonlinear Characteristic Curves, in *Proc. Int. Sci. Conf. on Energy Savings Electrical Engineering*, Warsaw, 2001, p. 298.
- ❑ *Kudrin, B.I.*, The System of State Management of Rational Utilization of Fuel-and-Energy Resources in the Russian Federation, *Prom. Energ.*, 2001, no. 8, p. 2.
- ❑ *Matyunina, Yu.V.*, The Quantity of Power in a Supply Agreement, *Elektrika*, 2002, no. 4, p. 43.
- ❑ *Kudrin, B.I.*, The Concept of Power Saving in State Standards and Its Practical Feasibility, *Elektrika*, 2002, no. 1, p. 3.
- ❑ *Kudrin, B.I.*, Organizational Problems of Efficiency of Power Consumption and Repairs, *Elektrika*, 2002, no. 8, p. 3.
- ❑ *Rodina, L.S.*, Modeling the Modes of Power Consumption at Oil-Transporting Enterprises, *Vestnik MEI*, 2002, no. 3, p. 71.
- ❑ *Nikiforova, V.N., Bodrukhina, S.S., and Lushnova, A.N.*, Legislative, Standard, and Metrological Support of Certification of Electrical Power, *Elektrika*, 2002, no. 5, p. 3.
- ❑ *Gamazin, S.I. and Petrovich, V.A.*, About the Determination of the Actual Contribution Made by the Consumer to the Distortion of the Parameters of Quality of Power, *Elektrika*, 2002, no. 7, p. 18.

- *Bure, I.G., Bure, A.B., Hevsuriani, I.M., Mosicheva, I.A., and Kurowski, T.,* O filtrze pradoym z kompensacya zaklocen w ukladzie otwartym, in Proc. VI Conference School on Electrical Engineering of Nonsinusoidal Currents EPN-2002, Zeliona Gura, 2002, p. 109.
- *Shevchenko, V.V., Arzamastsev, N.V., Mosicheva, I.A., and Hevsuriani, I.M.,* Combined Device of Reactive Power Compensation for Shop Consumers, Vestn. Mosk. Energ. Inst., 2002, no. 3, p. 77.
- *Ancharova, T.V. and Lushnova, A.N.,* Fire Hazard of Power Plants of Domestic Consumers, Vestn. Mosk. Energ. Inst., 2002, no. 3, p. 40.
- *Hevchenko, V.V., Kurowski, T., Bure, I.G., and Benysek, G.,* Optimized Hybrid Filter for AC Power Circuits, Elektrichestvo, 2002, no. 7, p. 15.
- *Avdeev, V.A., Tsyruk, S.A., and Belyaev, S.E.,* Analysis of the Electric Equipment of Ferrous Metallurgy Plants at Predesign Stages under Present-Day Market Conditions, Elekrika, 2002, no. 10, p. 21.

## ■ Dissertations

- *Fufaev, V.V.,* Cost-Oriented Determination of the Parameters of Power Consumption, Reliability, Assembly, and Repairs of the Electric Equipment of Enterprises of a Region, Dr. Sci. (Tech.) Dissertation, 2001.
- *Zhichkin, S.V.,* Methods of Providing Short-Term Management of Power Consumption under Conditions of Marketing a Technology (using the chemical industry as an example), Cand. Sci. (Tech.) Dissertation, 2001.
- *Poplevin, V.M.,* Development of Methods of Improving the Reliability of Systems of No-Break Power Supply (using the gas industry as an example), Cand. Sci. (Tech.) Dissertation, 2002.
- *Haziev, D.N.,* Development of Methods for the Selection of Cross Sections of Conductors and Cables in Designing Second-Level Objects in Power Supply Systems, Cand. Sci. (Tech.) Dissertation, 2002.

## ■ Partners

- Elektroyekt Company, Moscow
- Moskvich Company, Moscow
- Wrocław Polytechnic Institute, Institute of Electric-Machine Systems, Wrocław, Poland
- Voskresensk Mineral Fertilizers Company, Voskresensk, Moscow Region
- ZIL Company, Moscow
- Azot Company, Novomoskovsk, Moscow Region
- Technical University of Ilmenau, Germany
- West-Siberian Metallurgical Works, Novokuznetsk, Russia

# INSTITUTE OF POWER ENGINEERING

## Director of the Institute

**Vasilii V. ZHUKOV**

**Dr. Sci. (Tech.), Prof.**

**Tel.: (095) 362-7352, (095) 273-4175**

**Fax: (095) 273-4175**

**E-mail: [IEEDIR-all@mpei.ru](mailto:IEEDIR-all@mpei.ru)**

**[IEEDIR@mpei.ru](mailto:IEEDIR@mpei.ru)**

## Departments of the Institute

- Department of Higher Mathematics ..... 5.2
- Department of Power Plants ..... 5.4
- Department of Electrical Power Systems ..... 5.9
- Department of High-Voltage Engineering  
and Electrophysics ..... 5.14
- Department of Relay Protection and Automation  
of Electrical Power Systems ..... 5.16
- Department of Non-Conventional and Renewable  
Energy Sources ..... 5.18
- Department of Theoretical Foundations  
of Electrical Engineering ..... 5.20

Tel.: (095) 362-7392, (095) 362-7874

Fax: (095) 362-7213

E-mail: [MV-all@mpei.ru](mailto:MV-all@mpei.ru)

[MV@mpei.ru](mailto:MV@mpei.ru)

The department has on its staff  
78 lecturers and  
4 post-graduate students

Head of Department:  
Igor M. PETRUSHKO

Dr. Sci. (Phys.-Math.), Prof., Member of the  
International Academy of Informatization

### ■ Main Lines of Research

#### Research supervisors

- Partial differential equations  
Prof. I.M. Petrushko
- The homology and structural theory of rings and the arithmetic properties of analytical functions values  
Prof. A.A. Tuganbaev, Assoc. Prof. A.Ya. Yanchenko
- Branching processes in random mediums  
Prof. V.I. Afanas'ev
- Harmonic analysis, coding theory, approximations  
Prof. V.P. Yudin
- Functional analysis  
Prof. A.I. Kirillov
- Development of methods for asymptotic integration of singularly perturbed differential, integral, and integro-differential linear and nonlinear equations systems  
Prof. V.I. Prokhorenko, Prof. V.I. Safonov, Prof. A.A. Bobodzhанov
- Infinite-order nonlinear differential equations and corresponding Banach spaces  
Prof. G.S. Balashova
- Inverse problems for differential equations  
Prof. A.S. Barashkov
- The efficiency, reliability, and quality of ergodic systems  
Prof. G.V. Zhdanova
- Representation of functions by exponential series  
Prof. Yu.N. Frolov
- The quantum theory of motion and radiation of charged relativistic particles in electromagnetic fields  
Prof. B.V. Kholomai
- The theory and methods of development and application of computer support for mathematical education  
Prof. A.I. Kirillov

### ■ Agreements, Contracts, Projects Supported by State Budget

- Some problems of the qualitative theory of differential equations and extremum problems of the function theory

- Investigation of non-classical problems for partial differential equations in weight spaces

## ■ Key Publications

- *Afanasyev, V.I.*, On the Maximum of a Subcritical Branching Process in a Random Environment, Stoch. Proc. Appl., 2001, vol. 93, no. 1, p. 87.
- *Bobodzhanov, A.A., and Safonov, V.F.*, Volterra Integral Equations with Fast Varying Kernels and Their Asymptotic Integration (in Russian), Mat. Sb., 2001, vol. 192, no. 8, p. 53.
- *Petrushko, I.M., Kuznetsov, L.A., Prokhorenko, V.I., and Safonov, V.F.*, A Course in Higher Mathematics. Integral Calculus. Functions of Several Variables. Differential Equations: A Course of Lectures (in Russian), Moscow. MPEI Publisher. 2002.
- *Petrushko, I.M.*, About Degenerating Elliptic Equations, Abstracts of Papers at the International Congress of Mathematicians, Beijing, 2002, p.129.
- *Yudin, V.A.*, Polynomials of Least Deviation from Zero and Cubature Formulas of the Chebyshev Type (in Russian), Tr. Mat. Inst. Ross. Akad. Nauk, 2001, vol. 232, p. 45.

## ■ 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 (RNTs KI), Moscow

Tel.: (095) 362-7139, (095) 362-78 72

E-mail: [ES-all@mpei.ru](mailto:ES-all@mpei.ru)

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

Head of Department:  
Vladimir A. STARSHINOV  
Cand. Sci. (Tech.), Prof.

### ■ Main Lines of Research

#### Research supervisors

- Control of power plants under normal and emergency conditions  
Prof. V.P. Vasin
- Coordination and optimization of the levels of short-circuit currents  
Prof. B.N. Neklepayev
- Operation modes of basic electrical equipment of power plants and substations  
Prof. V.A. Starshinov
- Short-circuits and transient processes in dc and ac electrical plants; automation of electrical equipment design  
Assoc. Prof. Yu.P. Gusev

### ■ Agreements, Contracts, Projects Supported by State Budget

- Development of principal ways of coordinating the levels of short-circuit currents for the purpose of improving the reliability of the Unified Power System of Russia
- Computer software for the calculation of short-circuits in ac electrical plants with a voltage of up to 1 kV
- Development of computer software for the calculation of short-circuit currents in an operative dc grid of substations and power plants
- Software support for the system of automated development of design specifications for secondary circuits of control distribution center
- Software support for the automation of an electrical engineer operation
- Development of automated workplace for a shop automated measuring manager
- Development of instruction-and-training complexes for training the personnel of electrical shops
- Investigation and operation analysis of protective means for operative dc grids
- Software support for the calculation of short-circuits in ac and dc electrical plants with a voltage of up to 1000 V and for the calculation of self-starting of 6-kV induction motors
- Development of a system of computer-aided design and expert evaluation of dc facilities of power plants and substations
- Development of highly efficient means of improving the operation reliability of basic equipment of steam power plants
- Research and development of advanced high-speed gas-turbine power-generating units
- Development of a new generation of reactors and high-reactance current conductors using magnetoconcrete for limitation of short-circuit currents

- ❑ Optimization and coordination of the levels of short-circuit currents in electrical power systems
- ❑ Development of theoretical principles and means of diagnostics for auxiliary equipment of power plants and substations
- ❑ Development of computer software for the calculation of the selectivity of protective devices in an operative dc grid
- ❑ Development of software/hardware complex for testing operative dc grids of substations
- ❑ Optimization of operating modes of electrical equipment of thermal power plants
- ❑ Improvement of the equipment operation reliability under emergency conditions
- ❑ Development of software/hardware complex for automatic diagnostics of the storage batteries state

## ■ Key Publications

- ❑ *Neklepavev, B.N., Kryuchkov, I.P., Zhukov, V.V., and Kuznetsov, Yu.P.*, Guidelines for the Calculation of Short-Circuit Currents and Selection of Electrical Equipment (in Russian), Moscow. NTs ENAS Publisher, 2001.
- ❑ *Balakov, Yu.N., Misrikhanov, M.Sh., and Shuntov, A.V.*, Power Output Schemes for Power Plants: Methodological Aspects of Development (in Russian), Moscow. Energoatomizdat Publisher, 2002.
- ❑ *Misrikhanov, M.Sh., Sedunov, V.N., and Shuntov, A.V.*, Principles of Change-Over in Systems of Electrical Power Generation and Transport (in Russian), Moscow. Energoatomizdat Publisher, 2002.
- ❑ *Dushkin, N.D., Monakov, V.K., and Starshinov, V.A.*, Recommendations for Design, Assembly, and Maintenance of Buildings Involving the Use of Protective Switching-Off Devices (in Russian), Moscow. MPEI Publisher, 2002.
- ❑ *Vasin, V.P., Gonik, Ya.E., and Skopintsev, V.A.*, Problems Associated with Analysis of Accident Rate in Russian Power Systems (in Russian), *Izv. Ross. Akad. Nauk Energ.*, 2001, no. 4, p. 35.
- ❑ *Vanin, B.V., L'vov, Yu.N., L'vov, M.Yu. et al.*, Damage to 110 to 500-kV Power Transformers during Operation (in Russian), *Elektr. Stn.*, 2001, no. 9, p. 53.
- ❑ *Gusev, Yu.P. and Polyakov, A.M.*, Electrophysical Processes in Accumulators of Power Plants under Conditions of Short-Circuiting (in Russian), *Izv. Ross. Akad. Nauk Energ.*, 2001, no. 4, p. 99.
- ❑ *Minein, V.F. and Neklepavev, B.N.*, Topical Preferences for Presentations to the Next Session of CIGRE 2002 (in Russian), *Prom. Energ.*, 2001, no. 9, p. 54.
- ❑ *Zhukov, V.V., Maksimov, B.K., and Nikodimu, V.*, Singularities in the Construction of 6 to 10 kV Distribution Networks with Long Feeders (in Russian), *Elektro*, 2001, no. 1, p. 8.
- ❑ *Gusev, Yu.P. and Shisha, M.A.*, Checking the Cables of Electric Facilities with a Voltage of up to 1 kV for Thermal Stability and Non-Inflammability (in Russian), *Elektro*, 2001, no. 1, p. 36.
- ❑ *Barsukov, A.I., Sedunov, V.N., Shevchenko, A.T., and Shuntov, A.V.*, Concerning the Paper by B.N. Neklepavev and V.I. Trubitsyn "On the Permissible Number of Connections in Switchgears with Busbars" (in Russian), *Elektr. Stn.*, 2001, no. 1, p. 55.
- ❑ *Shuntov, A.V.*, Methodological Principles of Developing Power Output Schemes for Power Plants (in Russian), *Izv. Ross. Akad. Nauk Energ.*, 2001, no. 1.
- ❑ *Vostrosablin, A.A., Neklepavev, B.N., and Shuntov, A.V.*, The Efficiency of Measures Aimed at Limiting Short-Circuit Currents in Basic Networks of Electrical Power Systems (in Russian), *Izv. Ross. Akad. Nauk Energ.*, 2001, no. 4, p. 60.

- ❑ *Mozgalev, K.V., Neklepayev, B.N., and Shuntov, A.V.*, Neutral Modes and Short-Circuit Currents in Basic Electrical Networks (in Russian), *Izv. Ross. Akad. Nauk Energ.*, 2001, no. 5, p. 135.
- ❑ *Polyugayev, M.M., Khomitskii, S.V., and Shuntov, A.V.*, Testing the Microprocessor Systems of Monitoring and Control of the Electrical Equipment of Power Plants (in Russian), *Elektr. Stn.*, 2001, no. 11, p. 48.
- ❑ *Mozgalev, K.V., Neklepayev, B.N., and Shuntov, A.V.*, Stabilization of the Levels of Short-Circuit Currents in Networks of 110 kV and Higher (in Russian), *Electr. Stn.*, 2001, no. 12, p. 40.
- ❑ *Zhukov, V.V., Maksimov, B.K., Nikodimu, V., and Boner, A.*, New Technologies for the Development and Maintenance of 6–10 kV Distribution Networks (in Russian), *Vestn. Mosk. Energ. Inst.*, 2001, no. 3, p. 30.
- ❑ *Starshinov, V.A., Poido, A.I., and Piratorov, M.V.*, The Use of Additional Transformer Winding for Auxiliary Power Supply of Steam Power Plants (in Russian), in *Current Status and Prospects for Development of Electrical Technologies (X Bernardos Lectures): Abstracts of Papers to International Scientific-and-Technical Conference*, Ivanovo. IGEU Publisher, 2001, vol. 1, p. 66.
- ❑ *Starshinov, V.A., Poido, A.I., and Piratorov, M.V.*, Reactors for 6–10 kV Connections Using Magnetic Circuits of Magnetoconcrete (in Russian), in *Current Status and Prospects for Development of Electrical Technologies (X Bernardos Lectures): Abstracts of Papers to International Scientific-and-Technical Conference*, Ivanovo. IGEU Publisher, 2001, vol. 1, p. 67.
- ❑ *Starshinov, V.A., Poido, A.I., and Piratorov, M.V.*, Development of Keyboard Training Simulators of Turbogenerators and Their Use for Educational Purposes (in Russian), in *Current Status and Prospects for Development of Electrical Technologies (X Bernardos Lectures): Abstracts of Papers to International Scientific-and-Technical Conference*, Ivanovo. IGEU Publisher, 2001, vol. 1, p. 75.
- ❑ *Dolin, A.P. and Kozina, M.A.*, The Effect of the Structural Parameters of Stiff Leads of 110 kV and Higher on the Electrodynamic Stability In Case of Unsuccessful Reclosure (in Russian), in *Current Status and Prospects for Development of Electrical Technologies (X Bernardos Lectures): Abstracts of Papers to International Scientific-and-Technical Conference*, Ivanovo, IGEU Publisher, 2001, vol. 1, p. 68.
- ❑ *Kuznetsov, Yu.P., Neklepayev, B.N., Zhukov, V.V., and Kryuchkov, I.P.*, Basic Requirements Placed by State Standards on the Methods of Calculation of Short-Circuit Currents in DC Electrical Power Facilities (in Russian), in *Proceedings of the Scientific-and-Technical Seminar on Modern Solutions in the Design, Development, and Maintenance of Operative DC Systems of Power Plants and Substations*, Moscow. ORGRES Publisher, 2001, p. 24.
- ❑ *Bogdanov, A.D., Balashov, V.V., Kudryavtsev, V.N., Feshchenko, V.A., and Gusev, Yu.P.*, Theoretical and Experimental Methods of Determining the Short-Circuit Current in Operative DC Facilities of Power Plants and Substations (in Russian), in *Proceedings of the Scientific-and-Technical Seminar on Modern Solutions in the Design, Development, and Maintenance of Operative DC Systems of Power Plants and Substations*, Moscow. ORGRES Publisher, 2001, p. 35.
- ❑ *Bryzgalov, Yu.N. and Trofimov, A.V.*, Automated Workplace for Services of the Electrical Shop of Thermal Co-generative Power Plants (in Russian), *Novoye v rossiiskoi elektroenergetike (Elektronnyi zhurnal "Energopress")* (New in Russian Electrical Power Engineering (Energopress electronic journal)), 2001, no. 4, p. 3.
- ❑ *Starshinov, V.A.*, Improving the Efficiency, Maneuverability, and Reliability of Operation of Power Plant Equipment (in Russian), *Elektro*, 2002, no. 4, p. 25.

- *Starshinov, V.A., Vasin, V.P., and Samovichev, V.G.*, Progress in and Further Prospects for Raising the Level of Maintenance of the Electrical Equipment of Atomic Power Plants of Rosenergoatom Concern (in Russian), Moscow. VNIIAES Publisher (All-Russia Res. Inst. of Atomic Power Plants), 2002, p. 141.
- *Starshinov, V.A., Vasin, V.P., and Golovchan, V.D.*, Problems Associated with the Development of an Expert System for Assessment of the Technical State of the Electrical Equipment of Atomic Power Plants (in Russian), Moscow. VNIIAES Publisher (All-Russia Res. Inst. of Atomic Power Plants), 2002, p. 131.
- *Neklepayev, B.N.*, Scientific Principles Underlying the Choice of Electrical Equipment and the Coordination of the Levels of Short-Circuit Currents in Electrical Power Systems (in Russian), *Elektro*, 2002, no. 4, p. 34.
- *Smekalov, V.V., Dolin, A.P., and Pershina, A.P.*, Assessment of the State and Extension of the Service Life of Power Transformer Service (in Russian), in Technical Re-Equipment and Repairs of Power Plants, Moscow: IPK gosssluzhby, VIPKenergo (Inst. of Raising the Level of Skills of Civil Servants, All-Russia Inst. of Raising the Level of Skills of Civil Servants in the Field of Power Engineering), 2002, vol. 4, p. 120.
- *Pershina, A.P., and Dolin, A.P.*, Experiences in Integrated Diagnostic Inspection and Repairs of Transformers Using the Technology of Washing the Insulation (in Russian), in Technical Re-Equipment and Repairs of Power Plants, Moscow: IPK gosssluzhby, VIPKenergo (Inst. of Raising the Level of Skills of Civil Servants, All-Russia Inst. of Raising the Level of Skills of Civil Servants in the Field of Power Engineering), 2002, vol. 4, p. 155.
- *Smekalov, V.V., Dolin, A.P., and Pershina, N.F.*, Condition Assessment and Life Extension of Power Transformers, CIGRE Session 2002, p. 1.
- *Dolin, A.P., Smekalov, V.V., Pershina, N.F., and Degtyarev, S.A.*, The Failure Rate and Procedure of Inspection of Power Transformers in Russia, CIGRE Session 2002, p. 91.
- *Dolin, A.P., Smekalov, V.V., Smekalov, S.V., and Tarmogin, P.V.*, New Transformer Repair Technology of Washing Oil Containing Special Additional Additives, Int. Sci. Colloq. On High-Voltage Engineering, *Кольце*, 2002, p. 97.
- *Zhukov, V.V. et al.*, Construction of Modern Extended 6–10 kV Electrical Networks (in Russian), *Energetik*, 2002, no. 1, p. 24.
- *Zhukov, V.V.*, New Methods of Calculation and Experimental Determination of Short-Circuit Currents and Their Effect (in Russian), *Elektro*, 2002, no. 4, p. 18.
- *Zhukov, V.V. and Maksimov, B.K.*, Training and Retraining of Personnel in Power Engineering by Remote Instruction Methods (in Russian), *Elektro*, 2002, no. 4, p. 49.
- *Zhukov, V.V. and Maksimov, B.K.*, Improvements in 6–10 kV Distribution Electrical Networks (in Russian), *Novoye v rossiiskoi elektroenergetike (Elektronnyi zhurnal "Energopress")* (New in Russian Electrical Power Engineering (Energopress electronic journal)), 2001, no. 4, p. 10.
- *Gusev, Yu.P.*, Determination of Short-Circuit Currents in DC Operative Current Grids of Power Plants and Substations (in Russian), in Modern Electrical Power Systems and Control of These Systems, Novocheerkassk: YuRGTU Publisher (South-Russian State Technical Univ.), 2002, Part 2, p. 13.
- *Gusev, Yu.P., Dorovatovskii, N.M., and Polyakov, A.M.*, Assessment of the Technical State of the Storage Batteries of Power Plants and Substations in the Course of Operation (in Russian), *Elektro*, no. 5, p. 34.

## ■ Dissertations

- *Shuntov, A.V.*, Application of the Systems Approach to Development of Power Output Schemes for Power Plants, Dr. Sci. (Tech.) Dissertation, 2002.

- ▣ *Polyakov, A.M.*, Development of Methods and Technical Means for Theoretical and Experimental Determination of Short-Circuit Currents from Storage Batteries in View of the Variation of Their Parameters in the Course of Operation, Cand. Sci. (Tech.) Dissertation, 2001.

## ■ **Partners**

- ▣ Mosenergo Company, Moscow

## ■ **Unique Equipment**

- ▣ 2 x 150 kW training power plant — a full-scale physical model of the electrical part of a thermal power plant

Tel.: (095) 362-8424, (095) 362-7012

E-mail: [EES-all@mpei.ru](mailto:EES-all@mpei.ru)

[EES@mpei.ru](mailto:EES@mpei.ru)

The department has on its staff  
22 lecturers,  
35 research workers,  
and 39 Ph.D. students

Head of Department:

Vladimir A. STROEV

Honored Scientist of the Russian Federation

Dr. Sci. (Tech.), Prof., Member of the

Russian Academy of Electrical Engineering

### ■ Main Lines of Research

#### Research supervisors

- Development of methods and means for increasing the stability of electrical power systems  
Prof. V.A. Stroev
- Scientific principles of the optimization of the structure, parameters, and operating modes of electrical power systems  
Assoc. Prof. S.V. Shul'zhenko
- Development of automatic control systems for electrical power systems  
Assoc. Prof. N.G. Filippova
- Development of methods and means for ensuring the reliability of electrical power systems  
Prof. Yu.A. Fokin
- The usage of energy storage devices to raise the efficiency and reliability of electrical power systems  
Lead. Researcher D.V. Nikitin
- Development of the structure and methods of interconnection of the Unified Power System of Russia and the electrical power systems of European countries  
Sr. Researcher S.Yu. Syromyatnikov
- Development of measures aimed at energy conservation  
Prof. E.N. Zuev
- Automation of the processes of maintenance and repairs of distribution networks  
Assoc. Prof. I.S. Ponomarenko

### ■ Agreements, Contracts, Projects Supported by State Budget

- Development of simulation methods to be used in solving problems of electrical power systems control
- Development of mathematical models, algorithms, and computer software for the calculation of the steady-state stability of complex electrical power systems
- Development of mathematical models, algorithms, and computer software for the calculation of the steady-state stability of electrical power systems containing flexible links
- Development of the theory and analysis of the process properties of controlled transmission lines, intersystem links, and distribution electrical networks

- ▣ Investigation of modes and transients in electrical power systems under conditions of disturbances in view of the frequency variation
- ▣ Investigation of an extended power association under conditions of disturbances in the form of active power unbalance in view of frequency variation
- ▣ Theoretical problems associated with the investigation of transients in electrical power systems containing energy storage devices with a view to their efficient utilization
- ▣ Methods of simulation and investigation of transients in electrical power systems containing electric energy storage devices
- ▣ Investigation of operating conditions and analysis of electrical power quality in general-purpose electrical networks
- ▣ Methods and algorithms of determination of consumer's contribution to the deterioration of the electrical power quality at the point of common connection
- ▣ Analysis of electrical networks and certification of electrical power quality
- ▣ Investigation of the electrical network of Bratsk Aluminum Works, analysis of harmonic components, development of technical measures aimed at improving the electrical power quality

## ■ Key Publications

- ▣ *Zarudskii, G.K., and Koutler, P.P.*, Special Features of Calculations of Normal Operating Conditions of Superhigh-Voltage Power Transmission Lines (in Russian), Moscow. Institute of Raising the Skills Level of Civil Servants, Russian Civil Service Academy under the President of the Russian Federation, 2001.
- ▣ *Stroev, V.A., Nikitin, D.V., Gremyakov, A.A., and Kuznetsov, O.N.*, Functional Possibilities of Using Energy Storage Devices in Electrical Power Systems (in Russian), Vestn. Mosk. Energ. Inst., 2001, no. 1, p. 33.
- ▣ *Kartashev, I.I., Tul'skii, V.N., and Shamonov, R.G.*, Automation of the Power Quality Control, Procedural and Instrumental Support (in Russian), Vestn. Mosk. Energ. Inst., 2001, no. 5, p. 6.
- ▣ *Kartashev, I.I., Ponomarenko, I.S., Syromyatnikov, S.Yu., and Gouk, L.L.*, The Method of Instrumental Detection of Sources of Voltage Distortion and Determination of Their Effect on the Electrical Power Quality (in Russian), Elektrichestvo, 2001, no. 3, p. 2.
- ▣ *Mozgalev, V.S., Todirka, S.N., Bogdanov, V.A. et al.*, Information Support of Automated Control Systems for Distribution Electrical Networks (in Russian), Elektr. Stn., 2001, no. 10, p. 13.
- ▣ *Soldatov, V.A., Kalinin, L.P., Kiorsak, M.V. et al.*, Experimental Investigation of the Parameters and Operating Modes of a Controlled Series-Compensated Transmission Line (in Russian), Elektr. Stn., 2001, no. 9, p. 46.
- ▣ *Soldatov, V.A. and Loktionov, S.V.*, Methods of Calculation of Power Loss Derivatives by the Parameters of Controlled Devices in Branches of an Electrical Network (in Russian), Aspirant i Soiskatel', 2001, no. 3, p. 320.
- ▣ *Afanas'ev, D.A. and Zarudskii, G.K.*, Procedure for the Assessment of Corona Loss of Active Power in Aerial Superhigh-Voltage Transmission Lines (in Russian), Elektro, 2001, no. 2, p. 13.
- ▣ *Zarudskii, G.K.*, Calculation of Corona Loss of Power in Aerial Superhigh-Voltage AC Transmission Lines (in Russian), Elektro, 2001, no. 2, p. 13.
- ▣ *Zuev, E.N.*, Electrification Age (in Russian), Elektr. Zhizn', 2001, no. 2, p. 2.
- ▣ *Zuev, E.N.*, Subterranean Ways of Electricity (in Russian), Elektr. Zhizn', 2001, no. 5, p. 2.

- *Ponomarenko, I.S., Rodina, L.S., Sipacheva, O.V., and Skorniyakov, A.Yu.*, Integrated Automated Control System for Distribution Electrical Networks ERIS (in Russian), in *Electrotechnical Systems and Complexes: Collection of Scientific Transactions of Schools of Higher Education*, Magnitogorsk, 2001, p. 302.
- *Ponomarenko, I.S., Tyutyunov, A.O., Sipacheva, O.V., and Skorniyakov, A.Yu.*, Realization and Reduction to Practice of a Modern Control System for Distribution Electrical Networks (in Russian), in *Modern Computer Technologies in Automatic Control Systems for Distribution Electrical Networks: A Collection of Papers*, Moscow. NTs ENAS Publisher, 2001, p. 6.
- *Zelenokhat, N.I., Karpov, S.M., and Lomovitskii, A.S.*, Prospects for the Development and Application of Controlled Power Transmissions ....when Restructuring Electrical Power Systems(in Russian), in *Modern Computer Technologies in Automatic Control Systems for Distribution Electrical Networks: A Collection of Papers*, Moscow. NTs ENAS Publisher, 2001, p. 1.
- *Kartashev, I.I., Tul'skii, V.N., and Shamonov, R.G.*, Determination of the Actual Contribution by the Consumer in Problems of Calculation of Electricity Charges with Due Regard for Its Quality (in Russian), in *Collection of Papers to the All-Russia Scientific-and-Technical Conference on Energy System: Control, Quality, Safety*, Ekaterinburg. UGTU-UI Publisher (Ural State Technical Univ.-Ural Polytechnic Inst.), 2001, p. 34.
- *Zelenokhat, N.I., Vlasova, T.A., Islam, M., and Hardisty, A.*, The Application of Distributed Power Characteristic for the Optimization of Electrical Station Load in Complex Electrical Systems, in *Proc. 36<sup>th</sup> Universities Power Engineering Conf.*, Swansea, 2001, p. 1.
- *Kartashev, I.I., Ponomarenko, I.S., Tul'skii, V.N. et al.*, Analysis of the Results of Measurements in the Course of Power Quality Control in Electrical Power Networks (in Russian), in *Metrology of Electrical Measurements in Electrical Power Engineering: A Collection of Papers*, Moscow. NTs ENAS Publisher, 2001, p. 227.
- *Kartashev, I.I., Ponomarenko, I.S., and Yaroslavskii, V.N.*, Modern Means for Measuring the Quality of Electrical Power (in Russian), in *Metrology of Electrical Measurements in Electrical Power Engineering: A Collection of Papers*, Moscow. NTs ENAS Publisher, 2001, p. 208.
- *Filippova, N.G., and Berdnik, E.G.*, Automatic Search of Extreme Operating Modes of Electrical Power Systems by the Conditions of Steady-State Stability (in Russian), *Elektrichestvo*, 2002, no. 9, p. 9.
- *Ponomarenko, I.S.*, Reduction of Power Loss in Electricity Supply Systems and Their Instrumental Support (in Russian), *Energoberezhenie*, 2002, no. 1, p. 60.
- *Zapadnov, V.A., Maslennikov, G.K., and Ponomarenko, I.S.*, Immediate Measures to Reduce the Power Loss in Municipal Electrical Networks (in Russian), *Energoberezhenie*, 2002, no. 2, p. 42.
- *Kartashev, I.I., Ponomarenko, I.S., Tul'skii, V.N. et al.*, The Quality of Electrical Power in the Municipal Networks of the Moscow Region (in Russian), *Prom. Energ.*, 2002, no. 8, p. 42.
- *Ponomarenko, I.S. and Sumin, A.G.*, Automatic Device for Overvoltage Protection (in Russian), *Prom. Energ.*, no. 9, p. 42.
- *Efent'ev, S.N. and Zuev, E.N.*, The Ratio of Costs of Construction and Operation of 110—220 kV Aerial Transmission Lines: Part 1 (in Russian), *Vestnik MEI*, 2002, no. 2, p. 39.
- *Efent'ev, S.N. and Zuev, E.N.*, The Ratio of Costs of Construction and Operation of 110—220 kV Aerial Transmission Lines: Part 2 (in Russian), *Vestnik MEI*, 2002, no. 4, p. 31.

- ▣ *Zarudskii, G.K.*, The Process-and-Technical Limitations of the Carrying Capacity of Transit Superhigh-Voltage AC Transmission Lines (in Russian), *Elektro*, 2002.
- ▣ *Zarudskii, G.K.*, The Combination of Process-and-Technical Limitations of the Carrying Capacity of Transit Superhigh-Voltage AC Transmission Lines (in Russian), *Elektro*, 2002.
- ▣ *Zuev, E.N.*, On the Urgency of Introducing Standards for the Economic Density of Current (in Russian), *Elektro*, 2002, no. 6, p. 32.
- ▣ *Barinov, V.A. and Stroeve, V.A.*, The Methodology of Control of Development and Functioning of Complex Electrical Power Systems and Their Pools (in Russian), *Elektro*, 2002, no. 4, p. 7.
- ▣ *Barinov, V.A. and Stroeve, V.A.*, The Simulation and Analysis of Steady-State and Transient Operating Modes of Electrical Power Systems and Their Pools (in Russian), *Elektro*, 2002, no. 4, p. 10.
- ▣ *Kartashev, I.I., Tul'skii, V.N., and Shamonov, R.G.*, Instruments for Control and Analysis of the Quality of Electrical Power (in Russian), *Mir Izmer.*, 2002, no. 5-6, p. 4.
- ▣ *Ponomarenko, I.S., Kalugina, M.A., Sipacheva, O.V. et al.*, An Integrated Automatic Control System for Distribution Networks (in Russian), in Papers to the Jubilee Scientific-and-Practical Conference Devoted to the 50<sup>th</sup> Anniversary of the Institute of Raising the Level of Skills of Civil Servants: Section on Innovations in Energy Technologies, Moscow. Institute of Raising the Skills Level of Civil Servants, 2002, vol. 3.
- ▣ *Zarudskii, G.K.*, Development of the Procedure for Assessment of Power Loss Due to the Heating of Wires of Aerial Superhigh-Voltage Transmission Lines (in Russian), in Papers to the Jubilee Scientific-and-Practical Conference Devoted to the 50<sup>th</sup> Anniversary of the Institute of Raising the Level of Skills of Civil Servants: Section on Innovations in Energy Technologies, Moscow. Institute of Raising the Skills Level of Civil Servants, 2002, vol. 3, p. 205.
- ▣ *Ponomarenko, I.S., Vlasova, T.A., Kalugina, M.A., and Litvinov, A.L.*, Reduction of Power Loss in Electricity Supply Systems and Their Software-and-Technical Support (in Russian), in Collection of Papers to the International Scientific-and-Technical Seminar on Standardization, Analysis and Reduction of Power Loss in Electrical Networks – 2002, Moscow. VNIIE Publisher (Electrical Power Research Institute), 2002. s
- ▣ *Ponomarenko, I.S., Grishin, V.N., Prokof'ev, I.V., and Smirnov, D.V.*, Instruments for Energy-Related Surveys and Analysis of the Quality of Electrical Power in Electricity Supply Systems of Industrial Enterprises (in Russian), in Abstracts of Papers to the All-Russia Exhibition-Seminar on Energy Conservation in Regions of Russia – 2002, Moscow. VVTs (All-Russia Exhibition Center), 2002.
- ▣ *Kiselev, A.N. and Glazunov, A.A.*, Optimization of the Parameters of Urban Distribution Electrical Networks in View of Their Development (in Russian), in Papers to the Scientific-and-Technical Conference on Electricity Supply, Electrical Equipment, Energy Conservation, Novomoskovsk, 2002, p. 29.
- ▣ *Stroeve, V.A., Nikitin, D.V., and Kuznetsov, O.N.*, Mathematical Models of Energy Storage Devices for the Calculation of the Operating Modes of Electrical Power Systems (in Russian), in Proceedings of the International Scientific-and-Practical on Theoretical and Practical Problems Associated with the Development of Electrical Power Generation in Russia, St. Petersburg/SPbGTU Publisher (St. Petersburg State Technical Univ.), 2002.
- ▣ *Stroeve, V.A., Karasev, E.D., and Legkokonets, P.V.*, Generalization of Steady State Stability Criterion for Power Systems, in Proc. 14<sup>th</sup> Power Systems Computation Conf., 2002.
- ▣ *Barghouthi, K.S. and Nikitin, D.V.*, The Method of SMES Control for Improving Transient Stability of Electrical Power Systems, in Proc. 14<sup>th</sup> Power Systems Computation Conf., 2002.

- *Stroev, V.A.*, On Electrical Power Engineering Education, CIGRE Session 2002, Electric Power Engineering Education, Report F-06, Paris, 2002.

## ■ Dissertations

- *Islam, M.N.*, Improving the Process Characteristics of the Electrical Power System of Bangladesh by Way of Control Actions, Cand. Sci. (Tech.) Dissertation, 2001.

## ■ Partners

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

## ■ 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

Tel./Fax: (095) 362-7660  
E-mail: [TEVN-all@mpei.ru](mailto:TEVN-all@mpei.ru)  
[TEVN@mpei.ru](mailto:TEVN@mpei.ru)

The department has on its staff  
21 lecturers,  
25 research workers,  
and 14 Ph.D. students

Head of Department:  
Oleg A. NIKITIN  
Cand. Sci. (Tech.)

### ■ Main Lines of Research

#### Research supervisors

- Investigations of high-voltage electric discharges  
Prof. I.P. Vereshchagin, Assoc. Prof. A.A. Beloglovskii
- Lightning protection of power plants  
Prof. I.P. Vereshchagin, Assoc. Prof. A.G. Temnikov
- Overvoltages and electromagnetic compatibility in electrical power systems  
Prof. B.K. Maksimov
- Investigation of the processes and methods of internal insulation designing  
Prof. I.M. Bortnik, Assoc. Prof. Yu.S. Pintal'
- Lightning protection of aircraft  
Assoc. Prof. I.P. Kuzhekin
- The uses of high electric fields and electric discharges in industrial technologies  
Prof. I.P. Vereshchagin, Sr. Researcher S.A. Krivov
- Environmental problems of energetics  
Prof. B.K. Maksimov, Prof. I.P. Vereshchagin

### ■ Agreements, Contracts, Projects Supported by State Budget

- The uses 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 in lightning protection of long aerial 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
- An automated system for localization and determination of lightning discharges parameters
- Development of physical-mathematical models of electric discharges stages in gases
- New technologies based on nanosecond pulsed 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

- Development of recommendations for improvements in the lightning protection of 500—1150 kV transmission lines using a refined model of lightning stroke

## ■ Key Publications

- *Chunikhin, A.A., Kondratov, O.I., and Golteeva, E.F.*, Protective Devices: A Handbook (in Russian). Vol. 2. Surge Arresters, Moscow. Informelektro Publisher, 2001.
- *Surge Arresters* (in Russian), Moscow. Znak Publisher, 2001.
- *Orlov, A.V.*, Innovation Management (in Russian), Moscow. MPEI Publisher, 2002.
- *Maksimov, B.K. and Molodyuk, V.V.*, Analysis of Economic Efficiency of the Power Plants Operation in the Electrical Power Market (in Russian), MPEI Publisher, 2002.
- *Pintal', Yu.S. and Sergeev, Yu.G.*, Discharge in Air along a Contaminated and Moistened Insulator Surface (in Russian), Moscow. MPEI Publisher, 2002.

## ■ Partners

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

## ■ Unique Equipment

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

Tel.: (095) 273-0398, (095) 362-7477

Fax: (095) 273-0398, (095) 362-7477

E-mail: [rzias@fee.mpei.ac.ru](mailto:rzias@fee.mpei.ac.ru)

The department has on its staff

15 lecturers,

5 research workers,

and 13 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 of construction of training simulators and automatic training systems 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 theory of integrated microprocessor control systems 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**

- *D'yakov, A.F., Zasytkin, A.S., and Levchenko, I.I.*, Prevention and Elimination of Failures Due to Icing in Electrical Networks of Electrical Power Systems (in Russian), Pyatigorsk. RP Yuzhenergotekhnadzor Publisher, 2001.
- *Bass, E.I. and Doroguntsev, V.G.*, Relay Protection of Electrical Power Systems (in Russian), Moscow. MPEI Publisher, 2002.
- *D'yakov, A.F. and Platonov, V.V.*, Reduction of Tariffs — A Tool of Political Technologies and Economic Destruction of Russia's Future (in Russian), Moscow. MPEI Publisher, 2002.
- *D'yakov, A.F.*, Preservation of the Electrical Power System of Russia under Conditions of Privatization (in Russian), Moscow. MPEI Publisher, 2002.

## ■ **Dissertations**

- *Masalev, D.Yu.*, Investigation and Development of Methods for the Selection of Characteristics of Superconducting Inductive Storage in the Emergency Control System for Electrical Power Systems, Cand. Sci (Tech.) Dissertation, 2001.

## ■ **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

Tel.: (095) 362-7251, (095) 362-7574

Fax: (095) 362-7574

E-mail: [nvie@fee.mpei.ru](mailto:nvie@fee.mpei.ru)

The department has on its staff  
18 lecturers,  
2 research workers,  
and 15 Ph.D. students  
(of whom nine are Russian citizens  
and six are foreigners)

Head of Department:  
Vladimir I. VISSARIONOV  
Dr. Sci. (Tech.), Prof., Member of the  
International Energy Academy,  
of the Russian Academy of Electrical Engineering,  
of the Russian Academy of Water Management,  
and of the International Academy  
of Ecology and Nature Management

### ■ Main Lines of Research

#### Research supervisors

- The theory and methods of validation of facilities and systems parameters involving the use of renewable energy sources  
Prof. V.I. Vissarionov, Prof. N.K. Malinin
- The theory and methods of the operating modes validation of facilities and systems involving the use of renewable energy sources in systems of decentralized and centralized power supply  
Prof. V.I. Vissarionov, Prof. N.K. Malinin
- Environmental aspects of renewable energy sources utilization  
Prof. V.I. Vissarionov, Prof. N.K. Malinin
- Development of optimal management methods of hydroelectric power plant cascades in view of social and environmental requirements  
Prof. Yu.A. Aleksandrovskii
- The seismic safety of hydraulic structures  
Prof. L.N. Dudchenko, Prof. L.N. Marchuk
- Development of theoretical principles of operating modes optimization and construction of control systems for ac machines and units employing such machines, based on the use of non-conventional and renewable energy sources  
Prof. R.S. Tsgoev
- Management of projects for development of complex industrial-engineering systems utilizing methods and means for informatization and automation of design solutions  
Prof. M.G. Tyagunov

### ■ Agreements, Contracts, Projects Supported by State Budget

- Research and analysis of the technical-and-economic and environmental performance of small-scale hydropower industry in the world and in Russia
- Research aimed at developing standard power supply modules using non-conventional sources of electrical power standardized for interspecific application

- ❑ Development of recommendations for the operating modes of the Volzhsko-Kamskii cascade, aimed at raising the power production by the hydroelectric power plant in view of the demand of the participants in the water-management system
- ❑ Research and validation of the parameters and operating modes of floating compressor units powered by solar photo-voltaic batteries
- ❑ Research and development of methods of planning the operating conditions for wind-and-diesel power facilities in regional power systems of Russia
- ❑ Development of modern methods for analysis of the main categories of energy potential of small-scale hydropower industry in view of social and environmental factors

## ■ **Key Publications**

- ❑ *Vissarionov, V.I., Bezrukikh, P.P., Malinin, N.K. et al.*, The Resources and Efficiency of Utilization of Renewable Energy Sources in Russia (in Russian), St. Petersburg. Nauka Publisher, 2002.
- ❑ *Marchuk, A.N., Marchuk, N.A., and Argal, E.S.*, Revision of Construction Norms and Specifications for Concrete and Reinforced-Concrete Dams and Structures (in Russian), Gidrotekh. Stroit., 2002, no. 1, p. 15.
- ❑ *Marchuk, A.N.*, The Operation of Coastal Abutments of Arch Dams (in Russian), Gidrotekh. Stroit., 2002, no. 11, p. 10.
- ❑ *Aleksandrovskii, A.Yu., Silaev, B.I., and Chukanov, V.V.*, The Effect of the Evolution of River Bed Downstream on the Operating Conditions of the Power Equipment of a Hydroelectric Power Plant (in Russian), Gidrotekh. Stroit., 2002, no. 11, p. 20.
- ❑ *Vissarionov, V.I., and Golubev, V.I.*, Controlled Power Hydraulic Transmissions for Wind-Driven Power Plants (in Russian), Vestn. Mosk. Energ. Inst., 2002, no. 3, p. 21.
- ❑ *Golubev, V.I., Buranov, R.M., Vissarionov, V.I., and Zyubin, I.A.*, Raising the Efficiency of Wind-Driven Power Plants Using Hydraulic Transmissions (in Russian), Vestn. Kiev. Politekh. Inst. Ser. Mashinostr., 2002, issue 42, vol. 1, p. 202.

## ■ **Partners**

- ❑ AO Institut Gidroproyekt (hydroelectric power plant design institute), Moscow
- ❑ Research Institute of Power Facilities, Moscow
- ❑ All-Russia Research Institute for Electrification of Agriculture, Moscow
- ❑ Technische Hochschule, Konstanz, Germany

## ■ **Unique Equipment**

- ❑ Model of a power-generating complex consisting of a hydroelectric power plant and a solar power plant

Tel./Fax: (095) 273-4251

E-mail: [TOE-all@mpei.ru](mailto:TOE-all@mpei.ru)

[TOE@mpei.ru](mailto:TOE@mpei.ru)

The department has on its staff  
28 lecturers,  
1 Dr.Sc. student,  
and 2 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. V.M. Gevorkyan, 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 limiter of current. Mathematical simulation of processes in electric systems in the presence of a superconducting limiter of current
- Development of theoretical principles of employing virtual and information environments in the field of power generation and electrical engineering
- Research, manufacture, and testing of the power supply for a single-element ozonizer module

### ■ Key Publications

- *Demirchyan, K.S.*, Matrix Analysis of Electric Circuits Using Duhamel's Integral (in Russian), Izv. Ross. Akad. Nauk Energ., 2002, no. 3, p. 7.
- *Demirchyan, K.S., Demirchyan, K.K., Danilevich, Ya.B., and Kondrat'ev, K.Ya.*, Global Warming, Power Generation, and Geopolitics (in Russian), Izv. Ross. Akad. Nauk Energ., 2002, no. 3, p. 18.

- ❑ *Butyrin, P.A. and Alpatov, M.E.*, Development of an Analytical Model of the Transformer Theory (in Russian), *Izv. Ross. Akad. Nauk Energ.*, 2002, no. 2, p. 44.
- ❑ *Mironov, V.G.*, Determination of the Transfer Functions of Digital Filters (in Russian), *Elektrichestvo*, 2002, no. 2.
- ❑ *Mironov, V.G.*, Realization of Devices for Digital Signals Processing (in Russian), *Elektrichestvo*, 2002, no. 2.
- ❑ *Mironov, V.G. and Chobanu, M.K.*, Current Status and Prospects for the Development of Methods for Digital Processing of Multivariate Signals (in Russian), *Elektrichestvo*, 2002, no. 11.
- ❑ *Mironov, V.G.*, Experiences in Teaching the Discipline of "Digital Processing of Multivariate Signals" at Training Systems Engineers at the Moscow Power Engineering Institute (Technical University) (in Russian), in *Papers to IV International Conference on Digital Processing of Signals and Its Applications*, Moscow. MTsNTI Publisher (Moscow Center of Scientific and Technical Research), 2002.
- ❑ *Mironov, V.G., Chobanu, M.K., and Barat, V.A.*, The Use of Wavelet Transformation for Digital Processing of Univariate and Multivariate Signals (in Russian), in *Papers to IV International Conference on Digital Processing of Signals and Its Applications*, Moscow. MTsNTI Publisher (Moscow Center of Scientific and Technical Research), 2002.
- ❑ *Mironov, V.G.*, The Use of Matrix Pseudoinversion for Image Processing (in Russian), in *Abstracts of Papers to the International Informatization Forum*, Moscow. MFI Publisher, 2002, p. 101.
- ❑ *Vtyurin, S.A. and Mironov, V.G.*, Determination of Defects by Analyzing the Surface Image (in Russian), in *Abstracts of Papers to the International Informatization Forum*, Moscow. MFI Publisher, 2002, p. 93.
- ❑ *Zolotukhin, I.A. and Karataev, V.V.*, Analysis of Oscillations Excitation in a Coupled Multiloop Circuit in a Software/Hardware Environment (in Russian), in *Abstracts of Papers to the International Informatization Forum*, Moscow. MFI Publisher, 2002, p. 113.
- ❑ *Gerasimenko, V.P. and Nemov, Yu.N.*, A Virtual Model of an Adaptive System (in Russian), in *Abstracts of Papers to the International Informatization Forum*, Moscow. MFI Publisher, 2002, p. 117.
- ❑ *Koz'mina, I.S. and Materikin, S.V.*, The Use of LabVIEW Virtual Tools in Measuring the Electrostatic Field Intensity for Quality Control of the Electrical Equipment Insulation (in Russian), in *Abstracts of Papers to the International Informatization Forum*, Moscow. MFI Publisher, 2002, p. 109.
- ❑ *Shakirzyanov, F.N.*, Captured Light (in Russian), in *Proceedings of XIX International Conference on Gyromagnetic Electronics and Electrodynamics*, Moscow, 2002.
- ❑ *Gerasimenko, V.P.*, Virtual Instruments in Computer Modeling (in Russian), Moscow. MPEI Publisher, 2002.
- ❑ *Shakirzyanov, F.N. and Shakirzyanov, M.F.*, Some Aspects of Electrodynamics of Giant Energies (in Russian), in *Proceedings of the International scientific-and-technical conference in honor of 100<sup>th</sup> anniversary of L.R. Neiman*, St. Petersburg, 2002.
- ❑ *Butyrin, P.A. and Shakirzyanov, M.F.*, Fault Location in Aerial High-Voltage Lines (in Russian), in *Proceedings of the International scientific-and-technical conference in honor of 100<sup>th</sup> anniversary of L.R. Neiman*, St. Petersburg, 2002.
- ❑ *Butyrin, P.A., Zhokhova, M.P., and Shakirzyanov, M.F.*, State Equations Solving for Multiply Coupled Uniform Lines (in Russian), in *Proceedings of the International scientific-and-technical conference in honor of 100<sup>th</sup> anniversary of L.R. Neiman*, St. Petersburg, 2002.

- ❑ *Butyrin, P.A. and Alpatov, M.E.*, Development of the Analytical Transformer Theory (in Russian), in Proceedings of the International scientific-and-technical conference in honor of 100<sup>th</sup> anniversary of L.R. Neiman, St. Petersburg, 2002.
- ❑ *Butyrin, P.A., Kiselev, A.N., and Chin Hung-Lian*, Poincare Mapping for Solving Problems in Analysis and Control of Machine-Valve Systems of One Class (in Russian), in Proceedings of the International scientific-and-technical conference in honor of 100<sup>th</sup> anniversary of L.R. Neiman, St. Petersburg, 2002.
- ❑ *Vas'kovskaya, T.A.*, Investigation of Simplified Diagnostic Models of Three-Phase Transformers (in Russian), in Proceedings of the International scientific-and-technical conference in honor of 100<sup>th</sup> anniversary of L.R. Neiman, St. Petersburg, 2002.
- ❑ *Shatunova, O.A.*, Assessment of the Electromagnetic Processes Quality by the Geometric Shape Factor (in Russian), in Proceedings of the International scientific-and-technical conference in honor of 100<sup>th</sup> anniversary of L.R. Neiman, St. Petersburg, 2002.
- ❑ *Proskuryakov, K.N., Kaverznev, M.M., Karataev, V.V., and Golampur, M.*, Mathematical Models of Heat-Transfer Agent Oscillations for Improving the Thermohydraulic Codes and Control of Oscillatory Processes in Systems of Nuclear Power Plants (in Russian), in Collection of Papers to the scientific-and-technical conference on Scientific-Innovation Cooperation, Moscow. MIFI Publisher (Moscow Inst. of Engineering Physics), 2002, p. 126.

## ■ 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**

## **Director of the Institute**

**Oleg S. KOLOSOV**  
**Dr. Sci. (Tech.), Prof.**  
**Member of International**  
**Academy of Informatization**

**Tel.: (095) 362-7644**

**Fax: (095) 273-2872**

**E-mail: AVTFDEK-all@mpei.ru**

## **Departments of the Institute**

- **Department of Control and Informatics ..... 6.2**
- **Department of Computer Engineering ..... 6.4**
- **Department of Information-Measurement Technique ..... 6.6**
- **Department of Electrical Physics ..... 6.8**
- **Department of Applied Mathematic ..... 6.10**
- **Department of Computers, Systems and Networks ..... 6.13**
- **Department of Mathematical Modeling ..... 6.16**
- **Department of Electrical Engineering and Introscopy ..... 6.19**

Tel.: (095) 362-7407

E-mail: admin@dc.mpei.ac.ru

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.B. 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 Publication

- ❑ *Kabanov V.A.* Self-Organizing Neural Networks (in Russian). Report on International Conference "Information Means and Technologies". MPEI Publisher, 2001, p. 194.
- ❑ *Kolosoov O.S., Borisova I.E.* Algorithms of Reverse Digital Transformation for Control (in Russian). Vestnik MPEI, 2002, no. 4, p. 18.
- ❑ *Kolomeiceva M.B., Ho D.L.* Synthesis of Adaptive System on Base of Fuzzy Regulator (in Russian). Ural's Department of Russian Academy of Science. Mechanics and Processes of Control, 2001, no. 12, p. 41.
- ❑ *Kolosoov O.S., Anisimov D.N., Yagodkina T.V.* Researches results in Identification Area on Department of Control and Informatics (in Russian). Apparatus and Control Systems. 2001, no.8, p. 28.
- ❑ *Besedin V.M., Minyaev V.M.* Probability Determination of Object Missing under condition of Correlation in Scanning Trajectory (in Russian). Report on International Conference "Information Means and Technologies". MPEI Publisher, 2002, p. 184.
- ❑ *Filaretov G.F., Boyan D.* Compression of Information by Using Neural Networks for "Artificial Nose" Analyzer (in Russian). Report on Conference "Sensors and Converters of Information". Moscow Institute of Electronics and Mathematics, 2002.
- ❑ *Fomin G.A.* Decision Making Automatization in Data Processing by Using Evaluating Indicators (in Russian). Report on International Conference "Information Means and Technologies". MPEI Publisher, 2001, p. 174.

## ■ Dissertations

- ❑ *Ho D.L.* Synthesis of Adaptive Systems on Base of Fuzzy Regulator and Neural Nets Technology. Dr.Sci. (Tech.) Dissertation, 2002.
- ❑ *Hrobostov D.A.* Development of Neural Nets Technology for Determination of Calibration Characteristics of Sensors and Sensor Systems. Cand. Sci. (Tech) Dissertation. 2001.
- ❑ *Uskov A.A.* Development of Analysis Methods for Pulse-Frequency Systems with Bilinear Feedback in control object. Cand. Sci. (Tech) Dissertation . 2001.
- ❑ *Borisova I.E.* Algorithms of Numerical Differentiation in Control Tasks. Cand. Sci. (Tech) Dissertation. 2002.

## ■ 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

Tel.: (095) 362-7145  
E-mail: VT-all@mpei.ru

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

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

### ■ Main Lines of Research

#### Research supervisors

- Computer-aided synthesis of discrete systems and hardware/software co-design  
Prof. V.V. Toporkov
- Modeling, analysis and synthesis of dynamical systems  
Prof. G.S. Chkhartishvili
- High-level synthesis  
Prof. I.S. Potyomkin
- Methods of memory devices and systems design  
Prof. I.V. Ognev
- Databases design  
Prof. G.A. Borodin
- Systems on FPGA's  
Sr. Researcher N.I. Garbuzov, Assoc. Prof. A.P. Sharapov
- Information security methods and means  
Assoc. Prof. I.N. Andreeva

### ■ Agreements, Contracts, Projects Supported by State Budget

- Scalable computer systems (Grant on fundamental researches from Russian Ministry on Education)
- Methods of rapid prototyping in hardware/software behavioral synthesis
- Methods and tools for knowledge integration in CALS-technologies
- Tools for heterogeneous systems synthesis with automatic specification generation for hardware and software
- Methodology and tools for rapid prototyping in heterogeneous systems co-design
- Regularization of formal-heuristic procedures for analysis and synthesis of complex systems
- High-level synthesis based on UNIX-platforms
- Digital systems design and CAD of VLSI
- FPGA based system design
- Program encapsulations for databases

### ■ Key publications

- *Toporkov V.V.* Satisfiability of dataflow models of distributed programs. Program-ming and Computer Software, 2001, vol. 27, no. 5, p. 238.

- ❑ *Toporkov V.V.* Simultaneous scheduling and assignment of processes as optimization method of computer systems architectural solution. Automation and Remote control, 2001, vol. 62, no. 12, p. 2027.
- ❑ *Toporkov V.V., Toporkova A.S.* Characteristics optimization of computational processes in scalable resources. Automation and Remote control, 2002, vol. 63, no. 7, p. 1173.
- ❑ *Toporkov V.V.* System-level behavioral synthesis (in Russian). Moscow: MPEI Publisher, 2001.
- ❑ *Toporkov V.V.* Models and methods in system-level synthesis (in Russian). Moscow: MPEI Publisher, 1999.
- ❑ *Leshikhina I.E., Pirogova M.A.* Modeling of complex surfaces in modern CAD systems. Features of NURBS-method. Computer Aided Design. 2000, no. 1-2 (13), p. 27.
- ❑ *Ognev I.V., Borisov V.V.* Associative mediums (in Russian). Moscow: "Radio i svyaz" Publ., 2000.

## ■ Dissertations

- ❑ *Toporkov V.V.* Generation and choice of specified computing system's architectures based on invariant behavioral models. Dr. Sci. (Tech) Dissertation. 2000.
- ❑ *Masaleva I.B.* Design of tools for dynamic system's simulation. Cand. Sci. (Tech) Dissertation. 2000.
- ❑ *Kosharnovsky A.N.* Design and research of algorithms and processors for elementary functions computation. Cand. Sci. (Tech) Dissertation. 2000.
- ❑ *Polozov R.O.* Hierarchical model of access control for design of guarded objects. Cand. Sci. (Tech) Dissertation. 2002.

## ■ Partners

- ❑ European C.A.D. Standardization Initiative (ECSI), Grenoble, France
- ❑ Russian Academy of Sciences
- ❑ Ilmenau Technical University, Germany
- ❑ Central Institute of Air Engines, Moscow

## ■ Unique Equipment

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

Tel./Fax: (095) 362-7214

E-mail: zhelb@srv-vmss.mpei.ac.ru

The department has on its staff

20 lecturers,

2 research workers,

and 3 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 and development of pressure, temperature and other physical sizes gauges  
Prof. V.I. Didenko
- 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
- Digital signals processing  
Assoc. Prof. Yu.S. Solodov
- Measuring monitoring and diagnostics systems for high-voltage equipment  
Sr. Teacher A.P. Bykov
- Means of parameters quality measurement of DC and AC electric networks  
Sr. Teacher P.K. Makarychev
- Digital measurement of metals hardness and temperature  
Sr. Teacher V.F. Semenov

### ■ Agreements, Contracts, Projects Supported by State Budget

- Application of the function restoration theory on discrete readout for quality control increase and intellectual devices diagnostics
- Theoretical questions of the analysis, calculation and modeling of measuring units for data gathering systems
- Measuring system of windings mechanical condition diagnostics in power transformers
- Measuring system of metals hardness measurement
- Probability methods for testing and technical diagnostics of analog-digital and digital-analog converters
- Development of methods and technologies of preparation and retraining quality increase of the experts in metrology on the basis of computer training desks

## ■ Key publications

- ▣ *Evlanov Yu. N., Novikov V.A., Shatokhin A.A.* Single-crystal 80C552 micro-controller application in measuring technologies (in Russian). Moscow, MPEI Publisher, 2001.
- ▣ *Krug P. , Sulin K.* The Network Switcher for Fuzzy Motor Control using TMS320C24x Processor. Proceedings of the 3-rd European DSP Education and Research Conference. Abstract Reference Guide. Paris. September. 2000, p. 42.
- ▣ *Zhelbakov I.N.* The introduction to the Internet. Moscow, MPEI Publisher, 2000.
- ▣ *Didenko V., Minin A., Movchan A.* Polynomial and piece-wise linear approximation of smart transducer errors. Elsevier, Measurement Journal of the International Measurement Confederation. Special Issue: ADC Modeling and Testing. January 2002, vol. 31, no. 1, p. 61.
- ▣ *Didenko V., Movchan A.* Minimization of number of metrological parameters for data acquisition system. IEEE Transactions on Instrumentation and Measurement. February, 2002, vol. 51, no. 1, p. 88.

## ■ Partners

- ▣ «Rosuchpribor», Moscow
- ▣ The Russia research institute of a radio engineering, 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 24-10
- ▣ The measuring complexes for measurement of metals properties
- ▣ The chromatography measuring complex “POLICHROM”.
- ▣ The measuring monitoring system of transformers technical parameters «POLICOM RPN»

Tel.: (095) 362-7379

E-mail: supervisor@vvk2.mpei.ac.ru

The department has on its staff

26 lecturers,

2 research workers,

and 7 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. Yu.A. Kazantsev, Assoc. Prof. V.M. Gevorkyan
- Development of design and calculation methods for low-sized passive and active UHF devices  
Prof. Yu.A. Kazantsev, Assoc. Prof. V.M. Gevorkyan
- Real time system development for processing of one-dimensional and multi-dimensional signals  
Prof. V.G. Mironov
- Electromagnetic compatibility of electrical and power technical equipment  
Prof. Yu.A. Kazantsev
- Development and research of algorithms for digital systems of information processing  
Assoc. Prof. E.A. Borodkin
- Optoelectronic devices and methods for signal processing systems in real time  
Prof. S.K. Shmelev
- Structural reliability and queuing of information on-line systems  
Prof. A.A. Lipman, Assoc. Prof. V.M. Dmitriev

### ■ Agreements, Contracts, Projects Supported by State Budget

- Development and research of multirate digital systems
- Research of methods and systems for electromagnetic compatibility of the power electrical equipment. Simulation methods development of handicap electro-magnetic fields influence upon control and testing equipment, investigations of noise immunity increasing methods
- Research of speech recognition systems in real time
- Basic researches of an electromagnetic compatibility of testing and control systems of electrical and power equipment
- Measuring of electrical energy parameters at high voltage and creation principles of non-contact intellectual sensors and noise immune system of wireless data transfer
- Small-sized high-stable very high frequency devices for generation, shaping, selection handling and radiation of signals with application of dielectric resonators
- Development of electro-magnetic conditions monitoring system in vital functions environment of biological objects.
- The state-of-the-art review of development prognosis of methods and tools of analog signals registration, their processing, storage and transmission

## ■ Key publications

- ❑ *Kucharkin E.S.* Electrical Physics of Information Systems (in Russian). Moscow: Higher School Publisher, 2001.
- ❑ *Gevorkian V.M., Kazantsev Yu.A.* Electromagnetic compatability of informational system. Part 1. Physical simulation handicaps transfer machanisms (in Russian). MPEI Publisher, 2001.
- ❑ *Bounin Anatoly, Gevorkian Vladimir, Kazantsev Yury, Novikov Boris, Poloukarov Valery.* Heating system through cables. The 50<sup>th</sup> World Exhibition of Innovation, Research and New Technologies "Brussels Eureka", Brussels Expo (Heysel), 2001, Brussel, Belgium, p. 195.
- ❑ *Mironov V.G., Grigoriev A.N.* Methods of circuits synthesis on switching capacitors with temporal multiplexing (in Russian). Elektrichestvo. 2002, no.1, p.37.
- ❑ *Tchobanou M., Mironov V., Klyushkin V., Rychkov A., Stepachew A., Bolshakova O., Woodburn C.* Design and implementation of 2-D and 3-D multirate systems. Proceedings of International TICSP Workshop on Spectral Methods and Multirate Signal Processing, SMMSP'2002, Toulouse, France, September 7-8, 2002, p. 83.

## ■ Partners

- ❑ State unitary firm "All-Russian electrotechnical institute", Moscow
- ❑ "Antex ltd" company, Moscow
- ❑ University Tsinghua, Beijing, Peoples Republic of China
- ❑ The Norwegian university of science and technology, Trondheim, Norway
- ❑ "Girikond" company, Sankt-Petersburg
- ❑ OPTRON company, Moscow
- ❑ MILTA-GANG company, Moscow
- ❑ Special Research Bureau MPEI, Moscow

Tel.: (095) 362-7962

E-mail: PM@mpei.ru

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

Head of Department:  
Vitaliy P. KUTEPOV  
Dr. Sci. (Tech.), Prof.

### ■ Main Lines of Research

#### Research supervisors

- Languages and systems of parallel programming. Mathematical bases and software of modern computers, systems and networks  
Prof. V.P. Kutepov, Prof. Yu.P. Korablin, Prof. V.N. Falk, Assoc. Prof. O. Yu. Shamaeva, Assoc. Prof. M.P. Konoshenko
- Artificial intellect. Mathematical bases and software for intellectual systems: control systems and decision support systems, expert systems, learning systems etc  
Prof. V.N. Vagin, Prof. A.P. Ereemeev, Prof. D.A. Pospelov.
- Fundamental problems of artificial intellect  
Prof. D.A. Pospelov, Prof. V.N. Vagin, Prof. A.P. Ereemeev,
- Mathematical and software supplying of intellectual CAD systems, automated learning systems, informational systems and networks, computer graphics  
Prof. I.A. Bashmakov, Assoc. Prof. Kalitin S.S., Assoc. Prof. Sherbin V.M.
- Models of local computer systems and mobil cellular information transfer networks  
Prof. V.P. Klimanov
- Non-classical calculation models (possibilities logic, fuzzy sets, neural nets) for intellectual systems, multi-agent systems  
Assoc. Prof. E.Yu. Golovina, Assoc. Prof. A.N. Averkin, Assoc. Prof. V.B. Tarasov
- Modern informational systems software, 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. M.M. Maran, Assoc. Prof. V.D. Pashintsev, Assoc. Prof. P.B. Khorev
- Modern databases control systems and data processing means, corporative informational systems  
Assoc. Prof. V.A. Fedin, Assoc. Prof. V.I. Lukanina, Assoc. Prof. L.V. Churkina
- Investigation and application of graph models  
Assoc. Prof. V.A. Kokhov
- Modern control theory  
Assoc. Prof. R.M. Akchurin

### ■ Key publications

- *Golovina E.Yu.* Corporative informational system development technology with use of intellectual methods (in Russian). Informatsionnye sredstva iologii. International Conference. Yanus-K Publisher. 2002, vol. 1, p. 107.

- ❑ *Bashmakov A.I., Bashmakov I.A.* Antagonism resolution strategies in knowledge bases (in Russian). Vestnik MEI. 2001, no. 3, p. 80.
- ❑ *Eremeev A.P.* About correctness of decision making production model on the base of solutions table (in Russian). Avtomatika and Telemekhanika. 2001, no. 10, p. 78.
- ❑ *Eremeev A.P., Denisenko L.S.* Intellectual system prototype for decision making support for power object control (in Russian). Programmnye produkty i sistemy. 2001, no. 3, p. 38.
- ❑ *Bashlykov A.A., Eremeev A.P.* Expert diagnostic system as a components of decision making intellectual system in real time (in Russian). Novosti isskustvennogo intellekta. 2002, no. 3, p. 35.
- ❑ *Bashmakov I.A., Rabinovitch P.D.* Semantic nets models analysis as mathematical apporoac of knowledge representation of academic material (in Russian). Ingenerny zhurnal. 2002, no.7, p. 55.
- ❑ *Golovina E.Yu.* Instrumental software of intellectual systems creation for decision making support on the vase of logical-semiotic approach (in Russian). Informatsionnye tekhnologii. 2002, no. 3, p. 14.
- ❑ *Vagin V.N., Eremeev A.P.* Some basic principles of Design of Intelligent System for Supporting Real Time Decision Making. Journal of Computer and Systems Sciences Intern. 2001, no. 6, p. 953.
- ❑ *Eremeev A.P.* On correctness of the Production Decision Model Based on the Decision Tables. Automation and Remote Control. 2002, vol. 62, no. 10, p.1608.
- ❑ *Eremeev A.P., Vagin V.N.* A Real Time Decision Support Systems for Monitoring and Management of a Complex Object Using Parallel Processing. Proceedings of IEEE International Conference On Artificial Intelligence Systems (ICAS 2002), 5-10 Sept. 2002. Divnomorskoe, Russia, 2002, p. 139.
- ❑ *Eremeev A.P., Shutova P.V.* Learning and Adaptation in Real Time Decision Support Systems of a Semiotic Type. Proceedings of IEEE International Conference On Artificial Intelligence Systems (ICAS 2002), 5-10 Sept. 2002. Divnomorskoe, Russia, 2002.
- ❑ *Golovina E.Y.* An Approach to Designing Intelligent Decision Making Support Systems on the Basis of the Logic-Semiotic Apparatuses. Proceedings of IEEE International Conference On Artificial Intelligence Systems (ICAS 2002), 5-10 Sept. 2002. Divnomorskoe, Russia, 2002.
- ❑ *Allachverdi N., Vagin V.N., Yeremeev A.P.* The Prototype of a Real Time Decision Support Systems for Monitoring and Management of a Nuclear Power Block. Proceedings of the 2<sup>nd</sup> ICRM-2002, Gaziantep, Turkey. 2002, p. 448.

## ■ Dissertations

- ❑ *V. Falk*, Directed relations theory and its applications. Dr.Sci. (Tech.) Dissertation. 2001

## ■ 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
- ▣ Toulouse National university, France
- ▣ Universities of Manchester and Edinburgh, UK

Tel.: (095) 362-7558

E-mail: [vmss-all@mpei.ac.ru](mailto:vmss-all@mpei.ac.ru), [vmss@mpei.ru](mailto:vmss@mpei.ru)

The department has on its staff

31 lecturers,

10 research workers,

and 24 Ph.D. students

Head of Department:

Igor I. LADYGIN

Cand. Sci. (Tech.), Prof.

### ■ Main Lines of Research

#### Research supervisors

- Network computer technologies. Model construction, productivity evaluation and network node parameters measurement. Network representation

Prof. L.I. Abrosimov
- Computer and network systems of knowledge diagnostics

Assoc. Prof . V.A. Afonin
- Algorithms and methods of halftone images compression. Discontinuous processes modeling in GPSS

Assoc. Prof . A.G. Goltsov
- Development of medical apparatus based on PIC family micro-controllers

Prof. Yu.V. Gotovskiy
- 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 a 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
- Database design

Assoc. Prof . V.G. Dolotov
- Speech technologies and education process automation

Assoc. Prof . A.I. Evseev
- Development of the Department Intranet-environment

Assoc. Prof . A.F. Kryukov
- Research of modern principles for parallel data handling. Fault-tolerant computation systems development

Prof. I.I. Ladygin
- Information security. Modern cryptography. Electronic digital signature. Electronic money. Steganography and stegoanalysis

Prof. Yu.N. Melnikov

- Development of streaming and conveyor computing models. Investigation of computation system architecture, realizing streaming and conveyor principles of data handling  
Assoc. Prof . Yu.E. 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 simulation, based on a hardware description languages: VHDL and VERILOG  
Assoc. Prof . A.K. Polyakov
- Synergetics on Department of computers, systems and networks  
Assoc. Prof . N.N. Fadeev

## ■ **Agreements, Contracts, Projects Supported by State Budget**

- Investigation of architecture and functional components of perspective information systems
- Organization and model investigation of conveyor data processing processes in real-time applications
- Creation of the stand for continuous simulation and development of software for experimental development «Lira»
- Development of multiple-processor control system and supervisory control on basis of local control system
- Investigation of hardware/software complex creation possibility for electro-puncture diagnostics, endogenous and exogenous bio-resonance therapy, determination of composition and architecture of technical facilities, basic logical design
- Building of models and multi-sequencing methods of computational processes
- Reliability equipment research for jiggling control system for equipment of main contour heat transport of the nuclear power plant with WWER reactor

## ■ **Key Publications**

- *Abrosimov L.I., Homeriki I.O.* Effective usage organization methodology of hypertext systems for corporative computer networks (in Russian). Vestnik MEI. 2002, no. 6, p. 70.
- *Melnikov Yu.N., Kuzovenkov D.A.* Detection method of banking information being off-stage in files-containers (in Russian). Bankovskie tekhnologii. 2002, no. 2 (76), p. 43.
- *Melnikov Yu.N., Terenin A.A.* Recommendations on evidence of a software piratic usage fact (in Russian). Intellektual'naya sobstvennost. Avtorskoie pravo i smezhnoe pravo. 2002, no. 8, p. 56.
- *Melnikov Yu.N., Egorov P.E.* Modern condition of steganographic methods of information protection (in Russian). Proceedings of the International Conference "RusCripto". 2002, p. 47.
- *Afonin V.A., Fomenkov A.V.* Syndrome decoding algorithm in knowledge mutual checking system (in Russian). Proceedings of the International Conference "Mathematical methods in intellectual informational systems". Smolensk, Russia, 2002, p. 169.
- *Gotovskiy Yu.V., Kosareva L.B.* Endogenous and exogenous bio-resonance therapy. Formation stages and development prospects (in Russian). Proceedings of the 57<sup>th</sup> Russian homoeopathic congress. Moscow, 2002, p. 33.

- *Gotovskiy Yu.V., Kalachikov A.V., Moskaliova O.V.* Diagnostics and treatment on the base of "IMEDIS-TEST" method (in Russian). Proceedings of the VIII International Conference "Theoretical and clinical aspects of the bio-resonance and multi-resonance therapy application". Moscow, 2002, p. 304.
- *Dzegelionok I.I., Kuznetsov A.Yu.* Parallel multi-computer nets as development direction of super-computing systems (in Russian). Proceedings of Russian Electrical Institute. Moscow, 2002, p.22.
- *Kalinina G.A., Ladygin I.I., Morokhovetz Yu.E.* Reduced model of computing pipes on a regular components (in Russian). Proceedings of the International Conference "Informational means and technologies". Moscow. Yanus-K Publisher, 2002, vol. 1, p.14.
- *Ladygin I.I.* Architecture features of modern microprocessors (in Russian). Proceedings of the International Conference "Informational means and technologies". Moscow. Yanus-K Publisher, 2002, vol. 1, p. 82.
- *Informational-measuring* complex functioning at testing and thermal power plant harmful emission regulating (in Russian) // P.V. Rosliakov P.V., Zakirov I.A., Morohovetz Yu.E. et al. Proceedings of the International Conference "Informational means and technologies". Moscow. Yanus-K Publisher, 2002, vol. 1, p. 6.

## ■ Dissertations

- *Fomenkov A.V.* Organization of mutual network system of examination by using a model of p/t-diagnosable systems. Cand. Sci. (Tech.) Dissertation, 2002.

## ■ Partners

- State unitary enterprise "All-Russian electrotechnical institute", Moscow
- Problems of data communication institute RAS, Moscow
- Institute of microprocessor systems RAS, Moscow
- Scientific and technical center of Russian bank association, Moscow
- Construction department of informatics, hydro-acoustics and communications, Moscow
- Research-and-production company «Agrostroy», Moscow
- IBM Scientific center (Deutschland), Heidelberg, Germany
- Technical university of Ilmenau, Germany
- Technical university of Drezden, Germany

Tel.: (095) 362-7774

E-mail:

The department has on its staff  
35 lecturers,  
and 17 Ph.D. students

Head of Department:  
Julii A. DUBINSKIY  
Dr. Sci. (Phys. Math.), Prof.  
Honored Scientist of Russian Federation  
Member of International Academy  
of Sciences of High-School Institutions

### ■ 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, investigations of viscous gas models dynamics etc.  
Prof. A.A. Amosov, Prof. Ju.A. Dubinskiy, Prof. A. A. Zlotnik, Prof. N.V. Kislov
- Numerical methods for solving of mathematical physics and viscous compressible media dynamical problems with non-smooth data  
Prof. A.A. Amosov, 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 informatical 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  
Assoc. Prof . A.V. Knjazev, Assoc. Prof . V.S. Zubov

### ■ Agreements, Contracts, Projects Supported by State Budget

- Non-classical boundary problems and methods of their investigation
- Clifford analysis and nonlinear problems of mathematical physics
- Boundary problems for equations in partial derivatives in the frame of Clifford analysis
- Nonlinear equations systems for viscous compressible media dynamics
- Numerical methods for solving mathematical physics and viscous compressible media dynamics problems with non-smooth data
- Quasi-linear dynamic problems for compressible media and their two-scale homogenization
- Mathematical and information ensuring of business activity
- Analysis and implementation and verification principles development for intellectual systems of functional type
- Support systems for the financial promotion of scientific topic

## Key publication

- *Zlotnik A.A.*  $H^1$ -stabilization of velocity in one-dimensional viscous compressible barotropic flows. Doklady Math., 2002, vol. 65, no.1, p. 54.
- *Zlotnik A.A.* Stabilization of solutions to the two-scale equations of a viscous compressible barotropic medium. Doklady Math., 2002, vol. 65, no.1, p. 103.
- *Zlotnik A.A.* New stabilization characteristics for viscous compressible heat-conducting media equations with non-monotonous conditions equations (in Russian). Vestnik MEI. 2002, no.6, p. 43.
- *Opolchenov A.V., Frolov A.B.* Synthesis and verification of expert systems for decision making (in Russian). Izvestia RAN. Theory and control systems. 2002, no. 5, p. 101.
- *Opolchenov A.V., Frolov A.B.* Synthesis and Verification of Expert Decision-Making Systems. Journal of Computer and Systems Sciences International (A Journal of Optimization and Control). 2002, vol. 41, no. 5, p. 770.
- *Frolov A., Jako E., Mezey P.* Logical models of molecular shapes and their families. Mathematical Chemistry, 30(4), 2001, p. 389.
- *Amosov A.A.* Existence of global generalized solutions of single-dimension non-linear thermal viscoelastic equations with discontinuous data (in Russian). Proc. MIAN. 2002, vol. 236, p. 11.
- *Amosov A.A., Vestfalskii A.E.* Difference scheme for the system of equations of one-dimensional dynamics of a nonlinear thermoviscoelastic body of the Voigt type. Russian Journal of Numer. Anal, and Math. Modeling. 2002, vol. 17, no. 3, p. 221.
- *Amosov A.A., Vestfalskii A.E.* Uniqueness of solution of one non-linear difference scheme for single-dimension movement equation of viscous real gas with uneven data (in Russian). Vestnik MEI, 2002, no. 6.
- *Galkin P.A., Meshaninov D.G.* Equations solution analytical method in k-digit logic (in Russian). Vestnik MEI. 2002, no. 6.
- *Zubkov P.V.* About one analytic problem in half-string (in Russian). Vestnik MEI. 2002, no. 6.
- *Dubinskii J.A.* M.Reissing. Variational problems in Clifford analysis. Mathem. Meth. Appl. Anal, no. 25, 2002.
- *Dubinskii J.A.* Complex Neumann problem (in Russian). Vestnik MEI. 2002, no. 6.
- *Zabolotskaya E.N., Ishmukhametov A.Z.* Dual regulazed method in optimal control problem for parabolic system (in Russian). Proceedings of the RAS Computer Center «Simulation and analysis problems in decision making tasks», 2002.
- *Zabolotskaya E.N., Ishmukhametov A.Z.* Dual regulazed method in optimal control problems for hyperbolic system (in Russian). Proceedings of the RAS Computer Center «Simulation and analysis problems in decision making tasks», 2002.
- *Zubov V.S., Shevchenko I.V.* On comparative labor expenditures for shortest route finding in or-graph without cycles (in Russian). Vestnik MEI. 2002, no. 6.
- *Goritskii J.A.* Points assembly recovering on group observation of linear meters (in Russian). Vestnik MEI. 2001, no. 6, p.24.
- *Andrey Amosov, Alexander Zlotnik.* On two-scale homogenized equations of one-dimensional nonlinear thermoviscoelasticity with rapidly oscillated non-smooth data. C.R.Acad. Sci. Paris, 2001, t.329, Serie II b, p.169.
- *Amosov A.A., Zlotnik A.A.* Two-scaled averaging substantiation of equations for one-dimensional non-linear thermal visco-elasticity with uneven data (in Russian). Zhurnal vychislitelnoi matematiki i matematicheskoi fiziki, 2001, vol. 41, no. 10.

- *Dubinskii J.A., Begehr H.* Some orthogonal decompositions of Sobolev spaces and applications. Colloquium Mathematicum 2001, vol. 89, no. 2, p. 199.
- *Dubinskii J.A.* Some orthogonal decompositions of Sobolev's spaces and their application to Stox's system. Vestnik MEI, 2001, no. 6, p. 22.
- *Zlotnik A.A., Strashkraba I.* Solutions global behavior for one-dimension movement equations for viscous compressed barotropic liquid with variable viscosity (in Russian). Doklady RAN. Vol. 376, 2001, no. 6, p. 737.
- *Cherepova M.F.* Cachet problem for parabolic systems (in Russian). Vestnik MEI. 2001, no. 6.
- *Zubkov □.V.* About one task of function extension inside of monic circle in weighting spaces (in Russian). Vestnik MEI, 2001, no.6.
- *Zubov V.S., Sobolev M.I.* Effective algorithm for graph blocks detachment (in Russian). Vestnik MEI, 2001, □6.

## ■ Dissertations

- *Kireeva O.I.* Projective-gried methods for stationary and nonstationary 4th order equations with nonsmooth data. Cand.Sci. (Phys.Math.) Dissertation, 2001.
- *Goritskii Ju. A.* Methods of information analysis of multipositional measuring systems in the group objects conditions. Dr.Sci. (Phys.Math.) Dissertation, 2002.
- *Kazenkin □. □.* Global solvability of the one-dimentional flow-problem for the gas dynamic systems with nonsmooth data. Cand.Sci. (Phys.Math.) Dissertation, 2002.

## ■ Partners

- Moscow State University
- Institute of hydrodynamics (Russian Academy of Sciences), Novosibirsk, Russia
- Samara State University, Samara, Russia
- Institute of Computer mathematics (Russian Academy of Sciences), Novosibirsk, Russia
- Bergakademie Freiberg, Germany
- Mathematical Institute of Berlin Freie Universitat, Germany
- Ecole normale polytechnic, Lion, France
- Institute of mathematics (Czech Academy of Sciences), Prague

Tel.: (095) 362-7747, (095) 273-0350

E-mail: ETI-all@mpei.ru

The department has on its staff  
20 lecturers,  
3 research workers,  
and 10 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
- Algorithms for creating interactive educational system  
Prof. E.V. Kuznetsov

### ■ Agreements, Contracts, Projects Supported by State Budget

- Development of theoretical and experimental approaches for eddy current and magnetic techniques in steel and alloy product testing
- Creation of algorithms and software for inversion of diagnostic experimental data
- Development of eddy current fundamental theory and defect parameters measuring techniques for composite materials
- Development of signal processing algorithms to analyze information received from magnetic transducers in form of matrix
- Device development for crack evolution monitoring in corrosion environment conditions. Automatic data processing is expected
- Development of system for experimental data collection from built-in gauges under high-frequency load
- Development and release test devices INTROS (magnetic defectoscopes) for steel wire rope testing
- Creation of fundamental theory and algorithms for distance interactive multistage system compilation that is used for bachelor training

### ■ Key Publications

- *Lunin V., Barat V.* Wavelet Transform of Signal for Enhancement of SNR in Wire Rope Inspection, Review of Progress in QNDE, vol. 21, eds. D.O. Thompson and D.E. Chimenti (American Institute of Physics, NY, 2001), p. 707.

- *Nadeev A., Lunin V., Kononenko S.*, "Magnetic system of magnetostriction converter analysis with the finite elements method " (in Russian). *Avtomatica i Elektromekhanika*, science works collection. Astrakhan State university, Astrakhan, ASU Publisher, 2002, p.71.
- *Semenov A., Lunin V.*, "Fourier descriptors for eddy current signal classification applied to steam generator tubes testing" (in Russian), Reports of International Conference "Information devices and technique", 2002, vol. 1, p. 134.
- *Lunin V.*, "Defect parameters reconstruction using finites elements method" (in Russian). Proceedings of the 3-rd International Conference "Computer methods and inverse problems in nondestructive testing and diagnostic", 2002, p. 41.
- *Lunin V.*, "Effective procedure for finite element method modeling of electromagnetic testing problems" (in Russian). Proceedings of the 3-rd International Conference "Computer methods and inverse problems in nondestructive testing and diagnostic", 2002, p. 105.
- *Barat V., Lunin V.*, "Wavelet signals transform application for breaks localization in steel wire ropes" (in Russian). Proceedings of the 3-rd International Conference "Computer methods and inverse problems in nondestructive testing and diagnostic", 2002, p. 107.
- *Lunin V.*, "Defects influences field calculation in eddy current tasks" (in Russian). Proceedings of the 3-rd International Conference "Computer methods and inverse problems in nondestructive testing and diagnostic", 2002, p. 228.
- *Alexeevski D., Lunin V.P., Brauer H.*, "Application of Genetic Algorithm and Finite Element Method to the Interface Reconstruction in Magneto-Fluid-Dynamics", 3-d International Scientific Conference "Computer methods and inverse problems in NDT and diagnostics", 2002, p. 230.
- *Lunin V.*, "Modern approaches to interpretation of diagnostic data for evaluating defect parameters of metal components" (in Russian), Methods and technical devices of operative structural mechanical status of construction elements estimation (in Russian). All-Russian Scientific-Technical Conference. Report proceedings. □ oscow. MPEI Publisher, 2002, p. 392.
- *Lunin V.*, "Numerical estimation of the defect influence field in electromagnetic diagnostic of metal components task" (in Russian). All-Russian Scientific-Technical Conference. Report proceedings. □ oscow: MPEI Publisher, 2002, p. 396.

## Partners

- Moscow State Bauman Technical University (MSTU)
- Moscow scientific production association "Spector"
- VEECO Instruments, □□□
- "TransNeft"
- NIKIMT, Obninsk engineering center
- VNIIAES
- NIKIMT
- VIAM
- Gosgortekhnadzor 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, Saarbrücken, 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

## Director of the Institute

**Nicolay N. UDALOV**  
**Dr. Sci. (Tech.), Prof.**  
**Tel./Fax: (095) 362-7309**  
**Tel./Fax: (095) 273-3522**  
**E-mail: [RTFDEK@mpei.ru](mailto:RTFDEK@mpei.ru)**

**The Institute consists of two Faculties**

<b>Radio Engineering Faculty .....</b>	<b>7.2</b>
<b>Faculty of Electronics .....</b>	<b>7.27</b>

## RADIO ENGINEERING FACULTY

**Dean of the Faculty:** Nicolay N. UDALOV  
Dr. Sci. (Tech.), Prof.  
Tel./Fax: (095) 362-7309  
Tel./Fax: (095) 273-3522  
E-mail: RTFDEK@mpei.ru

<b>Departments of the Faculty</b>	
■ Department of Generation of Oscillations and Signals .....	7.2
■ Department of Fundamentals of Radio Engineering .....	7.5
■ Department of Radio Receivers .....	7.8
■ Department of Radio Engineering Systems .....	7.13
■ Department of Antennas and Radio Waves Propagation .....	7.15
■ Department of Radio Technical Devices .....	7.18
■ Research Department of Gyromagnetic Radio Electronics ..	7.21
■ Academic-Research Center of Modern Radio Electronic and Telecommunication Technologies .....	7.25

## FACULTY OF ELECTRONICS

**Dean of the Faculty:** Valery S. SOLDATOV  
Cand. Sci. (Tech.), Prof.  
Tel./Fax: (095) 362-7488  
E-mail: ETFDEK@mpei.ru

<b>Departments of the Faculty</b>	■ Department of Physics named after V.A. Fabrikant .....	7.27
	■ Department of Electronic Devices .....	7.30
	■ Department of Lighting Engineering .....	7.33
	■ Department of Industrial Electronics .....	7.36
	■ Department of Semiconductor Electronics .....	7.39

Tel.: (095) 362-7624, 362-7795, 273-0374

E-mail: fks@srv-vmss.mpei.ac.ru

The department has on its staff

19 lecturers,

1 research workers,

and 10 Ph.D. students,

1 Dr.Sc. student

Head of Department:

Nikolai N. UDALOV

Dr. Sci. (Tech.), Prof.

### ■ Main Lines of Research

#### Research supervisors

- Investigation of phase and amplitude fluctuations in circuits and systems used for signal generation and processing

Prof. V.N. Kuleshov, Assoc. Prof. T.I. Boldyreva

- Synchronization systems for communication channels using complex signals

Prof. N.N. Udalov

- Systems of radio electronic measurements and reserved communication using complex wideband and chaotic signals

Assoc. Prof. L.A. Belov

- Systems of frequency and phase control and chaotic oscillations in nonlinear systems

Prof. M.V. Kapranov

- Design of nonlinear circuits and devices for signal generation systems

Prof. V.N. Kuleshov, Assoc. Prof. G.I. Koptev

- Microwave and millimeter wave oscillations sources with extremely low PM noise

Assoc. 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 and processing in presence of noise in communication channel
- Development of a new generation of laboratory complexes (methodical documents, equipment and software) for the course «Signals generation»
- Development of reserved communication systems on the base of super-wideband and chaotic signals with high noise immunity
- 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 low power consumption microwave transistor oscillators optimized with respect to output power, efficiency and PM noise

## Key Publications

- ▣ *Belov L.A.* Secretive radio communication lines (in Russian). Radiotekhnicheskie tetradi. No. 25, p. 15.
- ▣ *Hilkevich V.V.* Ground covering parameters determination with the use of neural method (in Russian). Proceedings of the Conference "Remote sensing of ground covering and atmosphere by air-space methods". 2001, Murom, p.147.
- ▣ *Lebedinskiy A.S.* Investigation of communication systems using discrete chaotic signal for data transmit (in Russian). XVI European Forum on frequency and time. S-Peterburg, 2002, p.188.
- ▣ *Belov L.A., Voronin E.I.* Radio communication lines protectability evaluation against detecting (in Russian). Vestnik MEI, 2002, no. 4, p. 72.
- ▣ *Tsarapkin D.P.* Dielectric resonator with waves of type "whispering gallery" applications for frequency stabilization of UHF oscillators (in Russian). Radiotekhnika, 2002, no. 2, p. 28.
- ▣ *Tsarapkin D.P., Shtin N.A.* Performance limits of microwave oscillators with combined stabilization. XVI European Frequency and Time Forum. 2002, St-Peterburg, p. 45.
- ▣ *Kuleshov V.N., Belov L.A., Boldyreva T.I., Tsarapkin D.P.* High-stable low-noise oscillations sources for radio communication system (in Russian). Proceedings of the Conference "New technologies in radio electronics and control systems". 2002, Novgorod, p. 139.
- ▣ *Driakin E.V., Kuleshov V.N.* Multi-mode regime simulation of radiation source LSTI (in Russian). Vestnik MEI. 2002, no. 5, p. 74.
- ▣ *Tsarapkin D.P., Shtin N.A.* Whispering Gallery Resonators with Programmed Temperature Coefficient of Frequency. Proceedings of the 2002 IEEE/EIA International Frequency Control Symposium. 2002, New Orleans, USA, p. 565.
- ▣ *Tsarapkin D.P., Shtin N.A.* Sapphire Loaded Cavity Microwave Oscillator with Improved Temperature Stability. Proceedings of the 2002 IEEE/EIA International Frequency Control Symposium. 2002, New Orleans, USA, p. 572.
- ▣ *Kuleshov V.N., Boldyreva T.I.* PM and AM noise in Oscillators Based on Wideband BJT Amplifiers. Proceedings of the European Frequency and Time Forum. 2002, St. Peterburg.
- ▣ *Kuleshov V.N., Perfeliyev A.A.* PM and AM noise Analysis in Microwave BJT Oscillators Based on Polyharmonic Approach. Proceedings of the 2002 IEEE/EIA International Frequency Control Symposium. 2002, New Orleans, USA.
- ▣ *Kuleshov V.N., Boldyreva T.I.* PM and AM noise decreasing methods in oscillators on the base of wideband amplifiers on bipolar transistors (in Russian). Proceedings of the IV International Conference "Electronics and Informatics – 2002". Moscow, 2002.
- ▣ *Kuleshov V.N., Boldyreva T.I.* Internal noise analysis for wideband phase shifters on the base of bipolar transistor cascades with regulated amplification (in Russian). Proceedings of the IV International Conference "Electronics and Informatics – 2002". Moscow, 2002.
- ▣ *Kuleshov V.N., Boldyreva T.I., Sechkin A.V.* About measuring of bipolar transistor small-signal equivalent circuit on medium frequency (in Russian). Proceedings of the IV International Conference "Electronics and Informatics – 2002". Moscow, 2002.

- *Kapranov M.V., Tomashevskiy A.I.* Chaotic Phase Shift Keying Signal Generation. XVI European Frequency and Time Forum. 2002, St. Peterburg, p. 112.
- *Larionova M.V., Tomashevskiy A.I.* Time Unit Synchronization Restoration at the Receiver of Secure Communication System with Chaotic Signals. XVI European Frequency and Time Forum. 2002, St. Peterburg, p. 116.
- *Larionova M.V., Petrov A.S.* The Comparison of Discrete Time Map as Chaotic Carrier Source for Information Transmission System. XVI European Frequency and Time Forum. 2002, St. Peterburg, p. 121.

## ■ Patents

- Patent □ 19618 (Russia). Transmission system of coded information / L.A. Belov, O.A. Yamchikov // 2001, no. 25.
- Certificate □19618 (RF), IPC 7 □ 04 B 1/10. Communication System with Code Signals // L.A. Belov, O.V. Yamtschikov. Bull. □ 25 from 2001.

## ■ Dissertations

- *Khilkevich V.V.* Self-learning algorithms usage for different problems of radio waves introscopy. Cand. Sci. (Tech.) Dissertation. 2001.
- *Tschernischev A.Ju.* Information transfer systems with separate radiation of super-wideband signal components. Cand. Sci. (Tech.) Dissertation . 2001.
- *Voronin E.I.* Radio communication systems with increased transfer security. Cand. Sci. (Tech.) Dissertation. 2002.
- *Yamschikov O.V.* Transfer reliability increasing of digital information through cables lines. Cand. Sci. (Tech.) Dissertation. 2002.

## ■ 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 Polytechnique, 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 Spacial Equipment, Moscow
- Vladimir State University, Vladimir, Russia

Tel.: (095) 362-7044

E-mail: ort@srv-vmss.mpei.ac.ru

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

Head of Department:  
Vladimir G. KARTASHOV  
Dr. Sci. (Tech.), Prof.

## ■ Main Lines of Research

### Research supervisors

- Application of effect of a high-temperature superconductivity in microwave - microelectronics  
Prof. G.D. Lobov, Sr. Researcher S.A. Zhgoon
- Researches of acoustic properties of superhard thin-film and laminates materials  
Prof. G.D. Lobov, Sr. Researcher S.A. Zhgoon
- Development of functional devices for signal processing  
Assoc. Prof. V.V. Shtykov
- Development of the automated hardware-software complexes for research of the characteristics of radio engineering models and objects  
Prof. V.G. Kartashov, Assoc. Prof. B.P. Pollak
- Research of photo-receiving devices characteristics on the basis of available charge-coupled devices and development of image processing methods  
Assoc. Prof. L.A. Razumov, Assoc. Prof. V.A. Grechikhin
- Development of signal processing digital methods for ultrasonic non-destructive testing, laser anemometry and particle image velocimetry  
Prof. V.G. Kartashov, Assoc. Prof. V.A. Grechikhin
- Research and development of millimeter wave devices on high-anisotropic gyro-magnetic materials  
Assoc. Prof. B.P. Pollak
- Development of transmission lines and electromagnetic energy transmitters for instrumentation of KHF therapy  
Prof. V.F. Vzyatyshev, Assoc. Prof. G.P. Raevsky
- Development of methods and devices for signals processing and analysis for the tasks of medical diagnostics  
Assoc. Prof. M.N. Kramm
- Research of physical and technical properties of composite materials on the basis of high - anisotropic ferrite and creation of UHF and SHF devices on their base  
Assoc. Prof. B.P. Pollak

## ■ Agreements, Contracts, Projects Supported by State Budget

- Functional units on high-temperature superconductors
- Research of acoustic methods of studying of superconducting and superhard film materials
- Research of acoustic waves in laminates

- ❑ Research of a feasibility of wavelet-transformation for signal and image processing for fluid flows and gas diagnostics tasks
- ❑ Development of spatial-temporary signal processing methods for ultrasonic non-destructive testing
- ❑ Research of electromagnetic fields visualization methods inside of wave-guides and resonators
- ❑ 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
- ❑ Mathematical modeling of advanced antennas and processes governing propagation and diffraction of electromagnetic waves in real conditions

## ■ Key Publications

- ❑ *Rinkevichius B.S., Grechikhin V.A.* The features of analysis of the composite Doppler signals by digital methods. Laser anemometry advances and applications. Ed.J. Tumer, Limeric, 2001, p. 221.
- ❑ *Speedling-up* effects of hard carbon fields on surface acoustic waves on crystalline quartz. / Q. Zhang, S.F. Yoon, S. Zhgoon et al. Thin solid films, 2001, vol. 37, p. 276.
- ❑ *Properties* of diamond carbon films on crystalline quartz and lithium niobat / Q. Zhang, S.F. Yoon, S. Zhgoon et al. Diamond and related materials, 2001, vol.10, no. 9—10, p. 1843.
- ❑ *Density* od states distribution in aln films measured by cpm and dlts / V. Ligatchev, S.F. Yoon, J. Ahn et al. Diamond and Related Materials. 2001, vol. 10 / no 3-7. P. 1335.
- ❑ *Barinov A.E., Zhgoon S.A., Sukhov V.A.* Planar superconducting lumped element bandpass filter with spiral inductors. Physica C, 2001, vol. 355, p. 257.
- ❑ *Barinov A.E., Zhgoon S.A., Sukhov V.A.* Superconducting lumped element filter with spiral inductors. Microwave and Optical Technology Letters, 2001, vol. 29, no. 2, p. 94.
- ❑ *Kachanov V.K., Kartashev V.G., Popko V.P.* Application of signal processing methods to /ultrasonic non-destructive testing with high-level structural noise. Nondestr. Test. Eval. 2001, vol.33, p. 345.
- ❑ *Vziatyshev V.F., Kartashev V.G., Raevskiy G.P.* Principles of cased dielectric wave-guides design (in Russian). Radiotekhnicheskie tetradi. 2001, no. 23, p. 56.
- ❑ *Blue* room-temperature Photoluminescence of AlN films, prepared by magnetron sputtering / V.Ligatchev, S.F. Yoon, J. Ahn et al in Proceedings of MRS Symposium. Vol. 667, Luminescence and Luminescent Materials. 2002, San Francisco, CA, p. G5.11.1-G5.11.5.
- ❑ *Orlov S.A.* Input SAW duplexer for CDMA-450 standard (In Russian). Chip News. 2002, no. 9.
- ❑ *Nondestructive* investigations of 4-inch langasite wafers acoustic homogeneity / S.A. Sakharov, A.N. Zabelin, O.A. Buzanov et al. In Proceedings of International I Ultrasonic Symposium, 2002, Munich.

- ❑ *Shtykov V.V.* Program interface creation by means of modern FORTRAN (In Russian). Moscow. Dialog MIFI. 2001.
- ❑ *Barinov S.E., Zhgoon S.A.* Planar superconducting lumped element bandpass filter with spiral inductors. Superconductor Science and Technology. 2002, vol. 15, p. 1040.
- ❑ *Non-destructive* saw velocity determination in langasite // S.A. Sakharov, A.N. Zabelin, O.A. Buzanov et al. EFTF 2002.
- ❑ *Segen A.* Wavelets for Defect Depth and Size Retrieval in Thermography. QIRT, 2002, Conference Abstracts, Zagreb, Croatia, p. 23.
- ❑ *Rinkevichius B.S., Segen A.V.* Wavelet Analysis of Flow Visualization Images for Vortex Parameters Evaluation in Proceedings of ISFV-10 Conference, Japan, Kyoto, 2002. Paper no F0039.
- ❑ *Kudrashov T.V., Grechikhin V.A.* Research of the errors of particle velocity measurement by wavelet-analysis of the LDA signal model in Proceedings of 7 International Conference on Laser Metrology Applied to Science, Industry and Everyday Life, Novosibirsk, 2002, vol. 4900, p. 1164.
- ❑ *Kudrashov T.V., Grechikhin V.A.* Research of the LDA frequency evaluation errors by wavelet-analysis (In Russian). Izmeritelnaya tekhnika. 2002, no. 7, p. 38.
- ❑ *Grechikhin V.A., Raskovskaya I.L., Rinkevichius B.S.* Measurement truncation error for local pressure of sound field by laser Doppler anemometer (In Russian). Izmeritelnaya tekhnika. 2002, no. 6, p. 33.

## ■ Dissertations

- ❑ *Egorov S.S.* Research of properties of high — anisotropic ferrites on composite ferromagnetic materials, Cand. Sci. (Tech.) Dissertation, 2000.
- ❑ *Barinov A.E.* Research of resonance superconducting structures with concentrated units for devices of a microwave electronics engineering, Cand. Sci. (Tech.) Dissertation, 2001

## ■ Partners

- ❑ The All-Russia research institute of 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
- ❑ The Russian research-and-production association "Rosuchpribor", Moscow

## ■ Unique Equipment

- ❑ The technological complex on manufacturing of devices on the basis of high-temperature superconducting film materials by a method of a vacuum ion-beam deposition
- ❑ 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

Tel.: (095) 362-7384, 362-7005, 362-7030, 362-7941

Fax: (+7-095) 362-7005

E-mail: rpu@srv-vmss.mpei.ac.ru

The department has on its staff

22 lecturers,

13 research workers,

and 7 Ph.D. students

Head of Department:

Sergey V. SMOLSKIY

Dr. Sci. (Tech.), Prof.

Member of the International Academy  
of Electrical Engineering

Member of the International Academy  
of High Schools Institutions

Member of the International Academy  
of Informatization

### ■ Main Lines of Research

#### Research supervisors

- Development of radio measuring systems and devices for energy industries and enterprises

Prof. S.M. Smolskiy

- Development of rapid precision non-mechanical correlation measurers of velocity of different physical nature objects (vehicles, flows of fluids, gases, loose mediums)

Prof. D.V. Vasiliev

- The theory and technique of synthesis of optimum and adaptive receivers of discrete signals

Prof. L.I. Filippov

- Electromagnetic compatibility: constructive methods of ensuring

Prof. F.N. Pokrovskiy

- Screened and unclosed dielectric resonators and slot-hole integrated circuits of very high frequency range

Professor S.E. Bankov, Assoc. Prof. V.S. Dobromyslov

- Development of methods of synthesis and analysis of frequency selection microelectronic circuits with given parameters of quality

Prof. E.A. Bogatyrev, Head of Research lab N.N. Savkov

- Design of microelectronic devices on the base of system theory

Assoc. Prof. Yu.A. Grebenko

- 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. S.M. Smolskiy, Assoc. Prof. I.V. Komarov

- Investigation of radar-tracking signals reflected from different surfaces

Sr. Researcher V.A. Fedorov

- Development of spatially distributed systems of gathering, storage, remote transfer and handling of the information

Prof. E.A. Bogatyrev, Assoc. Prof. Yu.A. Grebenko

- Small-sized omni-directional antennas for satellite communication  
Prof. S.E. Bankov
- Development of technologies and tools for electronic text-books on digital signal processing preparation  
Assoc. Prof. V.P. Vasiliev
- Systems of open cut CAD of analogue, digital and combined radio electronic devices  
Assoc. Prof. V.D. Razevig
- 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. Yu.N. Antonov-Antipov
- Searching of spatial filtration algorithms, invariant to non-ideal antennas and receiving devices of radio electronic systems. Smart antennas  
Assoc. Prof. M.Yu. Lishak
- Making of intellectual portable gas signaling analyzers for ecological monitoring systems  
Prof. E.A. Bogatyriov
- 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 V.A. Fedorov
- Development of portable radio communication devices for the mobile operators who are inside of places with heightened danger (of extreme situations) and are at the low link in systems of personnel control  
Head of research lab N.N. Savkov
- Methods of parametric standardization and typization of construction elements of the radio electronic equipment. Security of high reliability on early design stages  
Prof. Yu.V. Kandyrin
- Problems of standardization in radio frequency identification systems  
Prof. S.M. Smolskiy
- Synthesis of signal processing algorithms in navigating receiving devices of space complexes such as GLONASS and GPS, effective in unfavorable noise and handicap circumstances  
Assoc. Prof. Yu.N. Antonov-Antipov
- Radio receivers of very high frequency range for measurers of non-electrical quantities  
Sr. Researcher E.E. Osipov
- Joint educational-research centers with foreign partners: problems and perspectives  
Prof. S.M. Smolskiy, Assoc. Prof. Yu.V. Sharov

## ■ **Agreements, Contracts, Projects Supported by State Budget**

- Development of integrated send-receive modules of a millimeter wave range for communication and low-range radar systems
- 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 principles, means, methods and algorithms for research of the signals reflected from terrestrial surfaces and biological objects
- ▣ Designing, manufacturing and test of two skilled copies of a remote radar-tracking measuring complex PULSAR of wide application (the foreign contract)
- ▣ Development of precision adaptive methods, algorithms and unified devices of operative automatic measuring of relative velocities for the monitoring system in metal industry, fluid heat transfer mediums, vehicles and multiphase flows
- ▣ Development of a rapid precision non-mechanical correlation velocity measurer for systems of safety motion on a railway transportation
- ▣ Diagnostic wireless informational-measuring complex for the operative express control of thermal and atomic power stations parameters, and also other extended power objects
- ▣ Joint scientifically technological structures with foreign partners at the Russian universities - one of ways of non-budget means attraction in system school-high school
- ▣ Consortia of the Russian universities and joint scientifically technological structures of the Russian universities in foreign countries - one of ways of investments attraction in an education system
- ▣ The analysis of signals reflected by ground surfaces and biological objects, for making an information databank and designing on its basis of measuring systems describing a state of objects
- ▣ Development of a precision radar-tracking measurer of a fluid and powder level in wraparound tanks
- ▣ Development of signal indicators of bins filling in systems of ash cleaner of thermal power plant output gases
- ▣ Adaptation of level serial measurers of a millimeter-wave range to requirements of industrial capacities filling by fluids and loose materials
- ▣ Development of portable radio talking of UHF range for the mobile operators who are taking place in zones of increased danger
- ▣ Development and making of the device for optimization of electrochemical processes of metals extraction from solutions and high clearing of galvanic sinks
- ▣ Development of the automated system of the comparative analysis and choice of alternatives

## ■ Key Publications

- ▣ *Bankov S.E.* Computer-aided-design methods for UHF radio receivers elements (in Russian). MPEI Publisher, 2002.
- ▣ *Smolskiy S.M., Filippov L.I.* Scientific research and dissertation as regular process (in Russian). MPEI Publisher, 2002.
- ▣ *Smolskiy S.M., Philippov L.I.* Scientific research and dissertation as the regular process. The Cyprus journal of science and technology, Cyprus. 2002, vol. 3, no. 1, p. 24.
- ▣ *Smolskiy S.M., Bogatyrev E.A., Malukov V.I. et al.* Informational measuring diagnosing complex for urgent parameters testing of thermal and nuclear power plants (in Russian). Proceedings of electronic conference "Fuel and energetic". MPEI, Moscow, 2002.

- ❑ *Integrated* receive-send modules of millimeter band. S.E. Bankov, A.E. Khanamirov, V.F. Radchenko, A.F. Khrunov / Proceedings of XV International Conference on Microwave Ferrites. MPEI Publisher, 2002, p. 40.
- ❑ *Modified* radar level meter. Proceedings of XV International Conference on Microwave Ferrites. S.E. Bankov, V.N. Zamolodchikov, D.V. Lebedev / MPEI Publisher, 2002, p. 46.
- ❑ *Antonov-Antipov Yu.N., Nedelin A.N.* Calculation method of passive handicaps power distribution upon distance (in Russian). Research proceedings of Altair Enterprise. Radio Electronic Systems. Iss. Technological, no. 1(4), 2002, p. 21.
- ❑ *Kandyrin Yu.V., Krayachich A.V.* Multi-criteria analogs choice on given prototype (in Russian). Proceedings of International Conference "Information technologies in education, technology and medicine", Volgograd, 2002.
- ❑ *Kangyrin Yu.V., Krayachich A.V.* Multi-criteria analogs choice features on the given prototype (in Russian). Proceedings of International Conference "Information technologies in education, technology and medicine", Volgograd, 2002? Part 2, p. 98.
- ❑ *Razevig V.D.* Circuit simulation system Microcap-6 (in Russian). Moscow, Telekom Publisher, 2001.
- ❑ *Razevig V.D.* ORCAD 9.2. system (in Russian) Moscow, SOLON-R Publisher, 2001.
- ❑ *Razevig V.D.* Printed circuit design system P-CAD 2001 (in Russian). Moscow, SOLON Publisher, 2001.
- ❑ *Razevig V.D.* P-CAD 2000: Commands reference book (in Russian). Moscow, Telekom Publisher, 2001.
- ❑ *Vasiliev D.V.* Complex signals displacement measuring and images processing in technical vision systems (in Russian). FTI Publisher, 2001.
- ❑ *Pokrovskiy F.N.* Electromagnetic compatibility ensuring in electronic devices constructions. MPEI Publisher, 2001.
- ❑ *Fedorov V.A., Driamin V.A., Shtykov V.V. et al.* Person functional conditions evaluation on the base of nonlinear-dynamic heart processes model (in Russian). Proceedings of Russian Conference "XXI century – medical sciences: from ideas to new technologies". Moscow, VINITI Publisher, 2001, p. 219.
- ❑ *Bankov S.E.* Two-dimensional periodic array of slit radiator (in Russian). Radiotekhnika i elektronika, 2001, no. 4, p. 10.
- ❑ *Bogatyrev E.A., Schukin A.V., Filatov V.A. et al.* Individual gas analyzing devices for personal safety ensuring (in Russian). Sensors and systems, 2001, no. 6.
- ❑ *Vasiliev D.V.* About development prospects of automatic trajectory correction systems (in Russian). Proceedings of IV Russian Conference "Development prospects of autonomous control systems in XXI century". S-Peterburg, 2001.
- ❑ *Kandyrin Yu.V., Kurbanova E.N., Sckurina G.I.* Models of procedures system for engineering design (in Russian). Conceptual design. Volgograd, p. 45, 2001.
- ❑ *Lishak M.Yu.* Formation in phasing antenna array directional diagram the widened zones for active handicaps suppression (in Russian). Proceedings of Conference "Naval complexes and systems". ALTAIR Publisher, 2001.
- ❑ *Grebenko Yu.A., Samokhodkin O.V.* Multi-frequency signals pic-factor decreasing at discrete information transmitting (in Russian). Radiotekhnicheskie tetradi, 2001, no 23, p. 52.
- ❑ *Grebenko Yu.A.* Analog complex filters (in Russian). Vestnik MEI, 2001, no. 4, p. 66.
- ❑ *Grebenko Yu.A., Schukin A.V.* Radio electronic system for remote state testing (in Russian). HIP NEWS – engineering microelectronics, 2001, 4.
- ❑ *Filippov L.I., Smolskiy S.M., Sokolov A.V.* Information transmission by return probe method (in Russian). Zarubezhnaya radioelektronika, 2000, 12, p. 5.

- ▣ *Filippov L.I.* Signal orthogonal decomposition principles (in Russian). Pribory i sistemy, 2001, □ 2.

## ■ 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
- ▣ Institute of machines of Russian Academy of Science (RAN), 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 technical university of Radio Engineering, Electronics and Automation  
Institute of higher nervous activity and neurophysiology of RAN, 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 company ALTECH Co. Ltd (Republic of Korea)
- ▣ The company HUAWEI Technology Corporation, Shenzheng, China
- ▣ The Beijing Institute of Technology (Faculty of electronics and communication), Beijing, Peoples Republic of China
- ▣ Khajeh Nasir Toosi University of Technology, Tehran, Iran
- ▣ The company CML, Great Britain
- ▣ Texas Instruments Corp., USA
- ▣ Institute of Radio Engineering and Electronics of RAN, Moscow

## ■ Unique equipment

- ▣ Complex of means of mathematical and semi-natural model operation of correlation velocity measurers
- ▣ 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

Tel.: (095) 362-7752, 362-7102

Fax: (095) 362-8938

E-mail: rtf\_rts@mail.ru;

acate@b14s1nt.mpei.ac.ru

The department has on its staff

13 lecturers,

and 7 Ph.D. students

Head of Department:

Yury A. EVSIKOV

Cand. Sci. (Tech.), Prof.

### ■ Main Lines of Research

#### Research supervisors

- Complex amplitudes method development for statistical analysis and simulation of radio devices and systems  
Prof. Yu.A. Yevsikov
- Radio engineering systems and devices statistical synthesis theory and methods at full and inexact prior information  
Prof. S.V. Pervachev
- Simulation of high-performance telecommunication systems, networks and devices  
Prof. N.S. Gubonin
- Development of nets, systems and devices of technological information transmission in power electric industry  
Assoc. Prof. V.A. Borisov

### ■ Agreements, Contracts, Projects Supported by State Budget

- System DVB-S for operational monitoring of transport flow parameters
- Design principles and signals processing algorithms in radio engineering equipment for radar and navigation technique
- Satellite channel access to ground ATM network investigation
- Application of effect of a high-temperature superconductivity in microwave - micro-electronics

### ■ Key Publications

- *Pervachiov S.V., Danilenko A.I.* Recognition of plausible function main maximum in the problem of signal source height measurement (in Russian). Radioelektronnye sistemy. Ser. Obschetechnicheskaya. 2001, no. 2(4), p.17.
- *Pervachiov S.V., Danilenko A.I.* Plausible function envelope for signal source height situated under reflecting surface (in Russian). Radioelektronnye sistemy. Ser. Obschetechnicheskaya. 2001, no. 2(4), p. 25.
- *Chilikin V.M.* Digital PLL system analysis in tracking mode. Radiotekhnicheskie tetradi. 2001, no. 23, p. 60.
- *Pervachiov S.V., Pavin A.N.* Quality characteristics determination of the ambiguity measurement revelation procedure for signal source (in Russian). Vestnik MEI, 2002, no. 5, p. 82.
- *Perov A.I., Plotnikov P.V.* Possibility investigation of chaotic processes usage in communication systems with information saving (in Russian). Proceedings of the Conference of CNIRES. Moscow, 2001, part 2, p. 32.

- *Ananiev N.A.* Transfer from analog to figure (in Russian). Proceedings of the Conference "Professional mobil radio communication". Moscow, 2001, p. 15.
- *Kharlamov V.A., Shkarin Yu.P.* About usage of the equipment with unmatched radio receiver (in Russian). Proceedings of the Conference "HF communication equipment through 35-750 kV electrical lines". Moscow, 2001, part 5, p. 1.
- *Kharlamov V.A.* Tele-informational complex for 0,4 – 35 kV distributive nets (in Russian). Proceedings of the Conference "HF communication equipment through 35-750 kV electrical lines". Moscow, 2001, part 5, p. 11.
- *Romanov S.E., Kharlamov V.A.* Digital speech HF channels (in Russian). Published at site [www.etl500.ru](http://www.etl500.ru)

## ■ Dissertations

- *Tersin V.V.* Analysis and optimization of transients in multi-channel radar systems with correlated feedback. Cand. Sci. (Tech.) Dissertation. 2001.

## ■ Patents

- Patent □ 2169991 (Russia). Ground mobil station of multi-satellite communication / E.Yu. Shitova // 2001. □ 18.
- Patent □ 2176853 (Russia). Ground mobil station of satellite communication / M.A. Koliada // 2001. □ 34.
- Patent □ 2190300 (Russia). Signals transmission system in three-phased electrical net // 2002.

## ■ Partners

- Special Research Bureau of MPEI, Moscow
- State research-and-production Association "Altair", Moscow
- Enterprise SWIT, Moscow
- "Energosviaz" – the branch of "Mosenergo", Moscow
- OAO RAO EES Rossii (Unified Power System of Russia) company, Moscow
- Association on education informatization

## ■ Unique equipment

- Equipment NSD550, 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

Tel.: (095) 362-7684, (095) 362-7242

E-mail: [aurrv@mpei.ru](mailto:aurrv@mpei.ru)

The department has on its staff  
15 lecturers,  
6 research workers,  
and 11 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  
Prof. E.N. Vasiliev
- 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

### ■ 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

- *Permyakov V.A., Onuchin V.V.* Calibration invariancy and Coulomb potential usage for electromagnetic field representation by circuital and non-circuital fields superposition (in Russian), in Proceedings of Russian Conference. "Electromagnetic waves radiation and dispersion", Taganrog, 2001, p. 13.
- *Sazonov D.M.* CAD of antenna arrays and mirror antennas. (In Russian), in Proceedings of Russian Conference. "Electromagnetic waves radiation and dispersion", Taganrog, 2001, p. 111.
- *Permyakov V.A.* Longitudinal electromagnetic waves in homogeneous isotropic in magnetic dielectric can not exist! (In Russian) / Radiotekhnicheskie tetradi, 2001, no. 23, p. 73.
- *Permyakov V.A.* Coulomb calibration, Helmholtz theorem and non-stationary electromagnetic field representation by sum of circuital and potential fields (In Russian), in Proceedings of XII Russian Conference "Diffraction and radio waves propagation", 2001, vol.1, p. 180.
- *Vasiliev E.N., Solodukhov V.V.* Hybrid (numerically-asymptotic) method for diffraction problems solution in quasi-optical region (In Russian) in Proceedings of XII Russian Conference "Diffraction and radio waves propagation", 2001, vol.1, p. 30.
- *Khzmalian A.D., Kondratiev A.C.* Antenna arrays phase synthesis methods. (In Russian) in Proceedings of XII Russian Conference "Diffraction and radio waves propagation", 2001, vol.1, p. 241.
- *Onuchin V.V., Permyakov V.A.* About the problems of Coulomb calibration and Helmholtz theorem usage at non-stationary electromagnetic field representation by sum of circuital and potential fields (In Russian) in Proceedings of XX Russian Conference "Radiowaves propagation", Novgorod, 2002, p. 425.
- *Isakov M.B., Permyakov V.A.* Circularly polarized electromagnetic beam reflection from non-uniform media at condition of acustica formation (In Russian) in Proceedings of XX Russian Conference "Radiowaves propagation", Novgorod, 2002, p. 480.
- *Sazonov D.M.* Wireless systems for electromagnetic power transfer for UHF and optical wave ranges (In Russian), Taganrog, 2002.
- *Sazonov D.M.* Mirror antenna bi-secant directional diagram synthesis (In Russian) in Proceedings of Crimea Conference, Sevastopol, Ukraine, 2001, p. 346.
- *Mishustin B.A., Sliozkin V.G., Shirokov I.B.* Coaxial colinear antennas development with consistent power dividers (In Russian) in Proceedings of Crimea Conference, Sevastopol, Ukraine, 2001, p. 392.
- *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.

## ■ Dissertations

- *Klimov, K.N.*, Application of the impedance mesh method to the electrodynamic analysis of 2D models of inhomogeneous (including plasma) media. Cand. Sci. (Techn) Dissertation, 2001.

## ■ Partners

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

Tel.: (095) 362-7248, (095) 362-7495

E-mail: rtp8@srv-vmss.mpei.ac.ru

The department has on its staff  
12 lecturers,  
and 7 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, Assoc. Prof. Yu.I. Lukashenko
- 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 radio signals of arbitrary form  
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

## ■ Agreements, Contracts, Projects Supported by State Budget

- Algorithms and devices of TV and radar-tracking signals analog-digital processing

- Fundamental problems of a super-broadband radar technique
- Research and development of antenna direction pattern digital formation
- Devices of coding, search and processing of communication systems signals on the basis of programmed digital logic
- Research and development of digital system of search and demodulation of frequency manipulated radio signals

## ■ Key Publications

- *Baskakov A.I., Ka Min-Ho, Sazhneva A.E.* System parameters influence on visa angle choice for interoferometer sunthesized aperture radar with "strict" base (in Russian). Earth investigations from space. 2001, no 1, p. 40.
- *Baskakov A.I. Ka Min-Ho.* Probe signals repetition frequency choice in precision oceanographic radio space-based altimeter (in Russian). Earth investigation from space. 2000, no.6.
- *Baskakov A.I., Abu Meshal Harb M.A.* Remote determination of sea surface rough level upon double-frequency correlation function of reflected signals (in Russian). Proceedings of Russian Conference "Earth surfaces and atmosphere remote sensing by air-space equipment". Murom, 2001, p. 366.
- *Baskakov A.I., Abu Meshal Harb M.A.* Usage of double-frequency radio interferometer and antenna aperture synthesis for sea waves height determination (in Russian). Proceedings of LVI scientific session devoted to Radio Day. Moscow, 2001, p. 239.
- *Baskakov A.I. Ka Min-Ho.* Correlation interval of radio-impulse fast fluctuations at reflection from sea surface in precision radio space-based altimeter (in Russian). Radioelektronika i informatica, 2001, p. 165.
- *Matiushin O.T.* Signals phase and frequency optimal measuring at low noise (in Russian). Radiotekhnicheskie tetradi. 2001, □ 21, p. 78.
- *Naryshkin A.K.* Hemming codes analysis, synthesis and receiving (in Russian). Vestnik MEI. 2001, no 4, p. 76.
- *Matiushin O.T.* Synthesis method of optimal analog-digital converters of radio signals frequency (in Russian). Radiotekhnicheskie tetradi. 2002, no 24, p. 21.
- *Matiushin O.T.* Synthesis of optimal analog-digital converters of radio signals frequencyat given realization condition (in Russian). Radiotekhnicheskie tetradi. 2002, no. 24, p. 37.
- *Voziakov S.V., Matiushin O.T.* Signals synthesis with low level of out-of-band radiation (in Russian). Radiotekhnika. 2002, no 3, p. 13.
- *Il'ichiov I.Yu., Matiushin O.T.* Required quality analysis of bit synchronization in digital information transmitting systems (in Russian). Radiotekhnicheskie tetradi. 2002, no 25, p. 13.

## ■ Patents

- Patent 2192653. Short-range radar for prevention of obstacles crash during flying vehicles manoeuvring at airdrom (in Russian). / A.I. Baskakov, V.I. Gusevskiy, V.A. Terekhov, C.E. Eliseev // Buletin of inventions, 2001.

■ **Partners**

- ▣ Special Research Bureau of Moscow Power Engineering Institute, Moscow
- ▣ NPO "Salut", Moscow
- ▣ Scientific Research Institute of Precision Instruments , Moscow
- ▣ Korean polytechnic university, Seoul, Republic of Korea

■ **Unique equipment**

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

Tel.: (095) 362-7958

E-mail: kitaitsev@mpei-14.mpei.ac.ru

The department has on its staff  
18 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
- Studies of physical-technical properties of composite materials based on high-anisotropic ferrites and creation of microwave and MMW devices  
Sr. Researcher A.A. Kitaitsev; Assoc. Prof. B.P. Pollak
- Development and investigation of millimeter wave devices based on high-anisotropic gyromagnetic materials  
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  
Sr. Researcher 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 I.S. Puchkov
- Investigation and development of radiowave methods of level measurements in industrial tanks (cavities)  
Sr. Researcher V.F. Radchenko, Lead. researcher A.E. Khanamirov
- 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 electro-magnetic compatibility in microwave and MMW bands (safe use of microwave energy, protection of computer and electronic equipment, etc.)  
Sr. Researcher 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
- Development and investigation of millimeter wave devices based on slotted wave guide hybrid integrated circuits  
Prof. S.E. Bankov, Lead. Researcher A.E. Khanamirov, Sr. Researcher V.F. Radchenko
- Development and investigation of printed antennas for satellite TV systems  
Prof. S.E. Bankov, Sr. Researcher V.F. Radchenko

## ■ 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
- Raising of electromagnetic effects safety
- NFMIR Investigation of alloyed hexa-ferrites for microwave electronics

- Long-term natural fault testing of oxygen analyzers AKP□-02-03, □□P□-02-04 and development of recommendations for analyzers reliability raising and for increasing time of their servicing between maintenance periods
- Automatic system for level control of acid, alkali and ammonia in industrial tanks (cavities) of the Chemical Shop of “Mosenergo” Thermoelectric Plant–12 based on radioisotope level gauges
- Creation of experimental batches of hexaferrite valves
- Development of methods and investigation of interaction of ultra-dispersed materials with electromagnetic radiation
- Development of industrial technology of manufacturing millimeter — range valves without external magnet on hexaferrites
- Radiowave control system for flue gases at thermoelectric plants
- Investigation of electro-dynamic parameters of layered structures
- Investigation of dielectric properties of nano-materials within the microwave and development of method for determination of these properties
- Parameters measurements of materials samples within 2.2- 50 GHz frequency range

## ■ Key Publications

- *Kitaitsev A.A., Shinkov A.A.* Composite material model at UHF and VHF ranges (in Russian) in Proceedings of IV International Conference on physical and technology problems of electrical materials and cables. Russia, Klazma, 2001, p. 149.
- *Electrodynamic* characteristics of alloyed baric ferrite (in Russian) / S.V. Serebriannikov, V.P. Cheparin, A.A. Kitaitsev et al. Proceedings of IV International Conference on physical and technology problems of electrical materials and cables. Russia, Klazma, 2001, p. 153.
- *Kitaitsev A.A.* Electromagnetic pulse radiation by hyromagnetic resonator at UHF excitation (in Russian). Proceedings of IV International Conference on physical and technology problems of electrical materials and cables. Russia, Klazma, 2001, p. 150.
- *Lebedev D.V.* Microprocessor technique in power supply sources (In Russian). Proceedings of IV International Conference on physical and technology problems of electrical materials and cables. Russia, Klazma, 2001, p. 247.
- *Shinkov A.A.* Intellectual uninterrupted power source (In Russian). Proceedings of IV International Conference on physical and technology problems of electrical materials and cables. Russia, Klazma, 2001, p. 245.
- *Kitaitsev A.A., Cheparin V.P., Shinkov A.A.* Effective dielectric permittivity of composite dielectric materials (In Russian). Proceedings of IV International Conference on physical and technology problems of electrical materials and cables. Russia, Klazma, 2001.
- *Kitaitsev A.A.* Electomagnetc field radiation by magnetic detector at pulse magnetic bias (In Russian) in Proceedings of X International Conference On Spin Electronics. 2001, Moscow.
- *Kitaitsev A.A., Shinkov A.A.* Frequency-selective ferrite harmonics filter with sizes 58x25 (In Russian) in Proceedings of X International Conference On Spin Electronics. 2001, Moscow.
- *Shinkov A.A.* Power uninterrupted sources with microprocessor control. (In Russian) in Proceedings of X International Conference On Spin Electronics. 2001, Moscow.
- *Some* problems of development of prospective UHF range valves (In Russian) in Proceedings of X International Conference On Spin Electronics / A.E. Khanamirov, S.S. Egorov, O.Yu. Uriadnikova, V.I. Ivanova, 2001, Moscow.

- ❑ *Koledintseva M., Kitaitsev A., Konkin V.* High Power Microwave Random Signal Measurement and Narrowband Signal Detection Against the Noise Background in Proceedings of International Render-Vous, Montreal, Canada. 2001.
- ❑ *Integrated* receive-send modules of millimeter band (In Russian) / S.E. Bankov, A.E. Khanamirov, V.F. Radchenko et al. In Proceedings of XI International Conference of Spin Electronics and hyrovector electrodynamics, Moscow, 2002.
- ❑ *Modified* radar level meter (in Russian) / S.E. Bankov, V.N. Bankov, D.V. Lebedev et al. In Proceedings of XI International Conference of Spin Electronics and hyrovector electrodynamics, Moscow, 2002.
- ❑ *Kitaitsev A.A.* Magnetization precession description in ferites monocrystals at magnetic bias filed fast changing (in Russian). In Proceedings of XI International Conference of Spin Electronics and hyrovector electrodynamics, Moscow, 2002.
- ❑ *Quality* evaluation system of fuel gas (in Russian). In Proceedings of XI International Conference of Spin Electronics and hyrovector electrodynamics, D.V. Lebedev, V.F. Radchenko, A.V. Khrunov, V.A. Sukhov. Moscow, 2002.
- ❑ *Radio* Spectroscopy and gas testing on thermal power plants (in Russian) / V.V. Gusev, E.P. Ivanova, S.M. Smolskiy et al (in Russian). In Proceedings of XI International Conference of Spin Electronics and hyrovector electrodynamics, Moscow, 2002, p. 477.
- ❑ *Avakian R.S., Teppone M.V., Madosian M.L., Khanamirov A.E.* UHF therapy technique (in Russian). In Proceedings of XI International Conference of Spin Electronics and hyrovector electrodynamics, Moscow, 2002.
- ❑ *Mikhailovskiy L.K., Pollak B.P., Khanamirov A.E.* Investigations and development UHF hexaferites devices in MPEI (in Russian). In Proceedings of XI International Conference of Spin Electronics and hyrovector electrodynamics, Moscow, 2002.
- ❑ *Radio* Engineering devices investigations and developments problems on the base experimentally corrected mathematical models / B.P. Pollak, A.E. Khanamirov, S.S. Egorov et al (in Russian). In Proceedings of XI International Conference of Spin Electronics and hyrovector electrodynamics, Moscow, 2002.
- ❑ *Gabeeva I.K., Puchkov V.F.* Ferrite sensors – UHF power converters in cross-multiplication mode (in Russian). In Proceedings of XI International Conference of Spin Electronics and hyrovector electrodynamics, Moscow, 2002.
- ❑ *Puchkov V.S.* Length measurer for extensive products (in Russian) / In Proceedings of XI International Conference of Spin Electronics and hyrovector electrodynamics, Moscow, 2002.
- ❑ *Waves* method of remittivity measurement (in Russian). P.L. Batov, M.K. Dambis, O.L. Domshanskaya et al. In Proceedings of XI International Conference of Spin Electronics and hyrovector electrodynamics, Moscow, 2002.
- ❑ *Kitaitsev A.A., Konkin V.A., Shinkov A.A.* Amplitude-frequency characteristic of ferrite-graphite absorber (in Russian). In Proceedings of XI International Conference of Spin Electronics and hyrovector electrodynamics, Moscow, 2002.
- ❑ *Basing* results of research and technology activity of Research Department “Gyromagnetic Radio electronics” (in Russian). In Proceedings of XI International Conference of Spin Electronics and hyrovector electrodynamics, Moscow, 2002.

## 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 The 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

### ■ **Unique equipment**

- ❑ Frequency — selective panoramic meter of spectral density of wide — band noise signal power
- ❑ High — precision meter of extended products
- ❑ Harmonic filter for powerful microwave radiation sources
- ❑ Ferrite resonance isolation gauges of MMW band
- ❑ Computerized system for measuring the occupation level in industrial tanks with the use of radio-location sensors

Tel.: (095) 362-7695  
Fax: (095) 362-8938  
E-mail: retfec@mpei.ac.ru

The department has on its staff  
1 Chief Researcher,  
2 Sr. Researchers,  
and 2 Ph.D. students

Head of the Center:  
Alexander I. PEROV  
Dr. Sci. (Tech.), Prof.

### ■ Main Lines of Research

---

Research supervisors

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

### Agreements, Contracts, Projects Supported by State Budget

- Research and development of complex processing digital algorithms of signals being arrived from satellite radio navigating systems GLONASS and GPS and from inertial navigational system of flying vehicles with the goal of navigational definitions accuracy and reliability increase
- Pre-discovery of neural networks methods possibility for processing of spatial diffused signals in radar, radio navigation and radio control systems
- Development of optimal complex measuring systems at non-stationary interfering influences with a priori non-defined statistical characteristics
- Justification of retrieval route of small-sized antenna interference canceller development for GLONASS, GPS systems customer equipment
- Investigation and modeling of signal processing algorithms for BAM equipment
- Pre-discovery on development of methods and algorithms of information processing in multi-positional distributed systems of air situation monitoring
- Pre-discovery of optimal algorithms of high-accurate and anti-jamming determination of air-force objects movement parameters in integrated INS/GLONASS navigational systems
- Investigation of engineering methods of main handicaps equipment creation (placed on different carriers) for ground and on-board customers of NAVSTAR system
- Development of automated working place structure for processing of external-trajectory and navigational information with the use of inertial system data
- Functional units on high-temperature superconductors

### ■ Key Publications

- *Perov A.I.* Optimum filtration of controlling parameter of discrete chaotic process with unknown initial meaning (in Russian). Radiotekhnika. 2001, no. 7, p. 3.
- *Perov A.I., Plotnikov P.V., Perov A.A.* Some aspects of final sample optimal evaluation for discrete chaotic process (in Russian). Radiotekhnika. 2001, no. 7, p. 9.

- ❑ *Perov A.I., Sokolov G.G.* Detection systems synthesis features and parameters evaluation by neural methods. Radiotekhnika. 2001, no. 7, p. 22.
- ❑ *Perov A.I.* Binary messages optimal evaluation transmitted on the base of chaotic oscillations (in Russian). Radiotekhnika. 2002, no. 7, p. 22.
- ❑ *Perov A.I.* Adaptive escort algorithms for maneuvering targets (in Russian). Radiotekhnika. 2002, no. 7, p. 73.
- ❑ *Perov A.I., Boldenkov E.N.* Noise immunity analysis of receiver PLL system for satellite radio navigating systems signals (in Russian). Radiotekhnicheskie tetradi. 2002, no. 24, p. 46.

## ■ **Partners**

- ❑ Section of applied problems of Russian Academy of Science
- ❑ Military aircraft technical university
- ❑ Special Research Bureau of MPEI
- ❑ Central institute of radio electronic systems
- ❑ "Radar-MMS" company, Sankt-Peterburg
- ❑ Russian Scientific Research Institute "Space devices designing"
- ❑ Design bureau "Navigation systems", Moscow

Tel.: (095) 362-7755  
Fax: (095) 273-0859  
E-mail: phf@mpei.ac.ru

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

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

## ■ Main Lines of Research

---

### Research supervisors

- Laser diagnostics of flows: applications in power engineering and thermal physics experiments  
Prof. B.S. Rinkevichus
- Applied laser optics  
Prof. E.F. Ischenko
- Quantum theory of resonance emission transport in excited mediums  
Prof. B.A. Veklenko
- Computer simulation of laser systems  
Prof. O.A. Evtikhieva
- Statistical optics and laser turbulence diagnostic  
Prof. V.I. Smirnov
- Solar photo energetic  
Assoc. Prof. I.I. Tuchov
- 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 computer simulation basis of high-precision laser measuring systems intended for examination of processes in power engineering equipment
- Laser diagnostics of ranked structures in strongly non-ideal plasma with macro-particles
- Development of laser measuring of velocity and gas bubbles sizes
- Development of a laser method of vortex and turbulent formations visualization at ground gas dynamic treatment of space vehicles
- Development of an informational search system in the field of optical methods of flows diagnostics
- Development of multifunction laser measuring system for processes diagnostics in power engineering installations
- Development of a laser Doppler vibrometer on the basis of modern optoelectronic and computer technologies
- Development of a laser tomography methods for volumetric visualization of vortex gas flows

- ❑ New optical systems of particle image velocimetry for hydrodynamic investigations
- ❑ Development of laser measuring system based on refraction and scattering of a light plane intended for vertex flow investigation in ecology problems
- ❑ Investigation of propagation, interference and scattering of laser beams in a fluid with bubbles under conditions of acoustic field
- ❑ Investigation of the phase features of laser beam scattering by big moving particles.
- ❑ Analysis of hybrid optoelectronic turbulence sensor performance by methods of computer and physical simulation

## ■ Key Publications

- ❑ *Optical* methods of flow investigation (in Russian). Proceedings of the VI International Conference /Under edition of Yu.N. Dubnischew, B.S. Rinkevichius, Moscow, MPEI Publisher. 2001.
- ❑ *Grechikhin V.A., Raskovskaya I.L., Rinkevichius B.S.* Measurement truncation error of sound field local pressure by laser Doppler anemometer (in Russian). *Izmeritelnaya tekhnika*, 2002, no. 6, p. 33.
- ❑ *Evtikhieva O.A., Esin M.V., Orlov S.V., Rinkevichius B.S., Tolkachev A.V.* Laser refraction methos for liquids investigation in swirling flows (in Russian). Proceedings of the III Russian conference on heat transfer. Moscow, MPEI Publisher, 2002, vol. 1, p. 197.
- ❑ *Esin M.V., Rinkevichius B.S., Tolkachev A.V.* Three-dimensional vizualization of vortical formations (in Russian). Proceedings of the III Russian conference on heat transfer. Moscow, MPEI Publisher, 2002, vol. 1, p. 201.
- ❑ *Rinkevichius B.S., Yesin M.V., Evtikhieva O.A., Orlov S.V., Tolkachev A.V.* Laser refractometral method for visualization of liquid mixing in twisted flows. In: CD Rom Proceedings. 10<sup>th</sup> International Symposium on Flow Visualization. (Kyoto, August 26-29, 2002), paper No. F037, p. 1.
- ❑ *Rinkevichius B.S., Yesin M.V., Tolkachev A.V.* 3D Images Reconstruction of the Objects with Indistinct Boundaries. Proceedings of the 7<sup>th</sup> International Symposium on Laser Metrology Applied to Science, Industry, and Everyday Life. Eds. Yu.V. Chugui, S.N. Bagaev, A. Weckermann, P.H. Osanna. 9-13 September 2002, Novosibirsk, vol. 4900, part 2, p. 1140.
- ❑ *Rinkevichius B.S., Segen A.V.* Wavelet analysis of flow visualization images for vortex parameters evaluation. In: CD Rom Proceedings. 10<sup>th</sup> International Symposium on Flow Visualization. (Kyoto, August 26-29, 2002), paper No. F039, p. 1.
- ❑ *Perevozchikov N.F., Sharikhin V.A.* Biological systems and a new type of the solar electromagnetic radiation (in Russian) Proceedings of the III International conference "Electromagnetic fields and human health". Moscow, 2002, p.185.
- ❑ *Smirnov Yu.M.* Excitations features of  $^1D_2$ - levels of strontium atoms by slow electrons (in Russian) *Doklady Akademii Nauk*. 2001, vol. 377, no. 5, p. 608.
- ❑ *Smirnov Yu.M.* Znl and ZnII dissociative excitation cross-section at electrons collision with ZnBr<sub>2</sub> moleculas (in Russian). *Khimia vysokikh energii*. 2002, vol. 36, no.1, p. 3.
- ❑ *Smirnov Yu.M.* Excitation cross-sections behavior of xenon atom with excited series (in Russian). *Optika i spektroskopia*. 2002, vol. 92, no. 3, p. 400.
- ❑ *Kuriatov V.N., Sokolov A.L.* Circular resonator polarization heterogeneity and head sea nonreciprocality (in Russian). *Quantovaya elektronika*. 2002, vol. 32, no. 4, p. 324.
- ❑ *Zubov V.A.* Amplitude-phase characteristics analysis of time changing optical signals and transfer functions (in Russian). *Quantovaya elektronika*, 2002, vol. 32, no. 6(360), p. 479.

- *Shapochkin M.* Full polarization beam experiment. *Fizika*, 2002, p. 1.
- *Smirnov V.I.* Laser Doppler Anemometer truncation error at non-uniform turbulent velocity fields measurement (in Russian). *Izmeritel'naya tekhnika*. 2002, no. 7, p. 34.
- *Skorniakova N.M., Sokolov M.M., Tolkachiov A.V.* Interferential laser method investigation for simultaneous measuring of bubble sizes and velocity (in Russian). Proceedings of the IIIrd Russian conference on heat transfer. Moscow. MPEI Publisher, 2002, Vol. 1. p. 219.

## ■ Dissertations

- *Shapochkin M.B.* Spectropolarimetry of atoms and ionized gas. Dr. Sci. (Phys.-Math.) Dissertation, 2002.
- *Esin M.V.* Interference patterns and optical images processing by computer approaches in flows laser diagnostics. Cand. Sci. (Tech.) Dissertation, 2001.
- *Skorniakova N.M.* Research of Gaussian beam dispersion upon moving particle in problems of flow laser diagnostics. Cand. Sci. (Tech.) Dissertation, 2001.

## ■ 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

Tel.: (095) 362-7254

E-mail: ed@srv-vmss.mpei.ac.ru

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

Head of Department:  
Valentin P. POPKO  
Cand. Sci. (Tech.), Assoc. Prof.

## ■ Main Lines of Research

---

### Research supervisors

- Development and research of vacuum and solid-state microwave devices and sets  
Prof. I.V. Lebedev
- Development of 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
- Development of the equipment and techniques of physical mechanical properties of metals studying by the analysis of acoustic emission signals at metals kinetic denting  
Professor V.K. Kachanov
- Fluctuations phenomena in electronic devices; diagnostics and evaluation of reliability of electronic elements and units  
Prof. M.D. Vorobiov
- Development and designing of electronic blocks for electrical charging of low-dispersed aerosol environments  
Prof. Yu.P. Finatiev
- Development and designing of electronic devices for frequency regulations and revolutions measurements of asynchronous electric motors of small and average power  
Prof. Yu.P. Finatiev
- Development, creation and application of thermal vision devices  
Assoc. Prof. V.N. Bodrov
- Development of processor devices of images entering and processing  
Sr. Researcher V.P. Maiorov

## ■ Agreements, Contracts, Projects Supported by State Budget

- Complex research of dated 1604 "saccos" material samples of metropolitan Alexis
- 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

- ▣ Numerical research of current passing in the electron beam device with the account of the emission characteristics of the thermionic cathode
- ▣ 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 work 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
- ▣ Development of methods and means for thickness measurement of extended concrete objects of biological protection of nuclear power stations
- ▣ Research and development of dynamic spatial-temporary modulator on the basis of perspective technologies of 21 century
- ▣ Research and development of the equipment units for realization ecologically pure synthesized technologies of fruit and vegetable production processing
- ▣ Development of scientific bases 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

- ▣ *Priority* of Russian scientists in development of Ultra Sound testing new means with increased informastiveness (in Russian) / V.K. Kachanov, V.P. Popko, A.I. Pitolin, I.V. Sokolov, A.Yu. Zorin. Quarterly journal review «In the world of the non-destroying testing», 2001, 2, p. 14.
- ▣ *Kachanov V.K., Kartashov V.G., Popko V.P.* Application of signal processing methods to ultrasonic non-destructive testing of articles with high structural noise. Nondestructive Testing and Evaluation. 2001, vol.17, p.15.
- ▣ *Vorob'iov M.D., Glumova M.V.* Research of cathode emission heterogeneity influence on the characteristics of electrovacuum devices (in Russian). Proceedings of the 11th International conference "Microwave technique and telecommunication technologies", Sevastopol, 2001, vol.1, p.152.
- ▣ *Lebedev I.V., Semencha M.V.* Quasi-active UHF power protective limiter (in Russian). Radiotekhnika i elektronika, 2001, no. 2, p. 75.
- ▣ *Lebedev I.V., Poliakov M.Yu.* Frequency properties of step varactor structures (in Russian). Radiotekhnika i elektronika, 2001, vol. 46, no. 4, p. 498.
- ▣ *Lebedev I.V., Poliakov M.Yu., Chuprov D.V.* Long line model and its application to the varactor structures frequency characteristics (in Russian). Radiotekhnika i elektronika, 2001, vol. 46, no. 12, p. 1.
- ▣ *Lebedev I.V., Chuprov D.V.* Dispersion characteristic of wave-guide slot-hole lines (in Russian). Radiotekhnika i elektronika, 2002, no. 2, p. 86.
- ▣ *Thermal* imager on pyrovidicon of new generation / V.N. Bodrov et al. Proceedings of the 17th International conference on photoelectronics and night vision devices (May 27-31, 2002, Moscow). 2002, p.232.
- ▣ *Vorob'iov M.D.* Application opportunities of numerical dynamic model of electron beam devices. Radioelectronics and computer science, 2002, no. 1, p. 16.
- ▣ *Lebedev I.V.* Radiofrequency "anomalies" of passive solid-state structures (in Russian). Radiotekhnika i elektronika, 2002, no. 8, p. 7.
- ▣ *Lebedev I.V.* Achievement of Russian scientists in the field of microwave electronics. Release 4 (in Russian). Radiotekhnika i elektronika, 2002, 2.
- ▣ *Vorobiov M.D., Glumova M.V.* The computer analysis and processes simulation in electron beam devices. IEEE Transactions on electronic devices. 2001.

## ■ Patents

- The patent application of Russian Federation «Device of the ultrasonic control», □□□7 G01N29/04. / I.V.Sokolov et al.

## ■ 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» , Fрязино, Moscow region
- «Scientific & Industrial Association "VIDEOSCAN"» , Moscow

## ■ Unique equipment

- Universal computer system for electron devices reliability evaluation 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 piezo-electric converters
- Installation for measurement of the physical-mechanical characteristics of concrete

Tel.: (095) 362-7067

Fax: (095) 362-7494

E-mail: budacvp@mpei.ru

The department has on its staff  
22 lecturers,  
1 research worker,  
and 13 Ph.D. students

Head of Department:

Artyom E. ATAEV

Dr. Sci. (Tech.), Prof.

Member of the Academy of Electrotechnical Sciences

### ■ Main Lines of Research

#### Research supervisors

- Development and creation of new high-efficiency gas-discharge visible and UV light sources  
Prof. A.E. Ataev
- Architectural lighting, light-technical design and ecology of visual perception  
Prof. A.V. Matveev, Assoc. Prof. V.I. Petrov
- Optimization of consumer light sources parameters  
Prof. V.S. Litvinov
- 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
- Mathematical simulation methods of radiation transfer processes in scattering and absorbing media  
Prof. V.P. Budak
- Optimization of optoelectronic image visualization systems parameters based on the statistical model of the visual organ  
Assoc. Prof. A.A. Grigoriev
- Investigation of visual perception regularities of TV stereo images  
Assoc. Prof. V.N. Martynov
- Development of high-quality visible and IR light-optical systems  
Assoc.-prof. V.I. Rychkov, Assoc. Prof. T.I. Yakushenkova
- Development of quality assessment methods of lighting and color image reproduction  
Assoc. -prof. V.Yu. Snetkov, Assoc. Prof. S.M. Lebedkova
- Application of computer simulation methods to lighting systems design  
Prof. V.P. Budak, Assoc. Prof. P.I. Petrov
- Investigation of spectral characteristics influence of radiation receivers and sources on photometric measurement errors  
Assoc. Prof. V.M. Petrov

### ■ Agreements, Contracts, Projects Supported by State Budget

- Development of 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 bench for simulation of night-vision devices and their parameters measurement
- Development of the algorithm and methods of automatic systems creation for detection and identification of objects over random backgrounds in the presence of optoelectronic systems additive noises
- Development of the gas-discharge lamp based on the DB-8 with increased radiation output within 300–400 nm
- Development of intelligent lighting control systems functioning algorithms
- Development of the mathematical model of image transfer in active pulsed image visualization systems
- Mathematical model development of polarized radiation reflection from natural formations
- Functional units on high-temperature superconductors.

## ■ Key publications

- *Petrov V.I., Grebenko Yu.A., Eliseev N.P., Fomin A.G.* Automated Lighting Control Systems in Public Buildings (in Russian). Lighting Engineering, 2001, no. 4.
- *Ataev A.E., Eliseev N.P.* Problems of energy saving in lighting systems (in Russian). Energy saving, theory and practice: Collection of scientific and technical and tutorial articles and papers in 2 parts. Part 2. Moscow. Amipress, 2002.
- *Ataev A.E.* Work of the lighting engineering problem council of section 10 of RF AES in 2001 (in Russian). Lighting Engineering, 2002, no. 1.
- *Guttsait E.M.* Conference “Young Russian lighting engineers” (in Russian). Lighting Engineering, 2002, no. 1.
- *Emelyanov N.I.* On the activities of “Russian light” association in 2001 (in Russian). Lighting Engineering, 2002, no 1.
- *Karachev V.M. et al.* On improvement of the principles of standardization and the new concept of road lighting norms (in Russian). Lighting Engineering, 2002, no 4.
- *Budak V.P., Petrovichev A.V.* The realistic synthesis of three-dimensional stage lighting and image compression based on the equal-contrast color model (in Russian). Lighting Engineering, 2002, no 4.
- *Rychkov V.I.* The monument not made by human hand (in Russian). Lighting Engineering, 2002, no. 5.
- *Karyakin N.A.* On the quality of modern scientific papers on lighting engineering (in Russian). Lighting Engineering, 2002, no 5.
- *Trembach V.V.* Reminiscences about N.□. Karyakin, scientist and man (in Russian). Lighting Engineering, 2002, no. 5.
- *Litvinov V.S.* To the centenary of N.□. Karyakin (in Russian). Lighting Engineering, 2002, no. 5.
- *Budak V.P.* Problems of theoretical lighting engineering in the works of N.□. Karyakin (in Russian). Lighting Engineering, 2002, □ 5.

## ■ Dissertations

- *Grigoriev A.A.* The statistical theory of image reception in optoelectronic visualization systems. Dr. Sci. (Tech) Dissertation, 2001.
- *Fomin A.G.* The power consumption research and optimization in automated lighting control systems of public buildings. Dr. Sci. (Tech) Dissertation, 2000.
- *Veklenko B.B.* The mathematical model of polarized radiation reflection from natural formations, Cand. Sci. (Tech) Dissertation, Ph.D. thesis, MPEI, 2002.

- ▣ *Petrovichev* ▣.V. Realistic images simulation of three-dimensional stage lighting on the computer monitor, Cand. Sci. (Tech) Dissertation, 2002.

## ■ 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

Tel.: (095) 362-7422, 362-7424,

Fax: (095) 362-7424

E-mail: Pe-all@mpei.ru

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 semiconductor 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

### ■ Agreements, Contracts, Projects Supported by State Budget

- Resonant thyristor invertors 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

- ❑ *Popkov O.Z.* Fundamentals of converter's technology. Non-control rectifiers (in Russian). MPEI Publisher, 2001.
- ❑ *Popkov O.Z.* Fundamentals of converter's technology. Controlled nets convertors (in Russian). MPEI Publisher, 2001.
- ❑ *Voronin P.A.* Power semiconductor switches (family, characteristics, application) (in Russian). "Dodeka - XXI" Publisher. 2001.
- ❑ *Panfilov D., Remizevitch T., Arkhipov A.* Simplest debugging means for family HC 908 micro-controllers of MOTOROLA (in Russian). Radio. 2002, no. 2, p. 2 7.
- ❑ *Remizevitch T.* New micro-controllers models of HC908 family by MOTOROLA. (in Russian) - CHIP NEWS, 2002, no. 5 (68), p. 5.
- ❑ *Remizevitch T., Arkhipov A., Ovchinkin C., Chepurin I.* Micro-controller debugging strategies of MOTOROLA YC908 family or many-sided internal simulator ICS08 (in Russian). CHIP NEWS, 2002, no. 6 (69), p. 5.
- ❑ *Kozachenko V., Remizevitch T.* Micro-controllers for built-in systems of electrical motor control (in Russian). Review of element base. Eight-byte «Motor Control». Electronic Components, 2002, no. 7, p. 31.
- ❑ *Bychkov M., Remizevitch T.* Modern components for electric drive (in Russian). Electronic components, 2002, no. 6, p. 85.
- ❑ *Chaplygin E.E., Kalugin N.G.* Output magnetico-connected filters of voltage invertors (in Russian). Practical Power electronics, 2002, no. 6.
- ❑ *Bonomorskiy O.I., Voronin P.A.* "Combined semiconductor switches development tendencies with field control (in Russian). Power Electronics, 2002, no. 6.
- ❑ *Lebedev A.G., Nedoluzhko I.G.* Power MOS transistor models for commutation processes analysis (in Russian). Vestnik MEI, 2002, no. 5.
- ❑ *Poliakov V.D.* Circuit simulation of active non-linear resistive loads (in Russian). Vestnik MEI. 2002, no. 4, p. 49.
- ❑ *Poliakov V.D.* Circuit simulation of non-linear resistive inertial loads (in Russian). Chip News, 2002, no. 6(69), p. 66.
- ❑ *Shipalov A.S., Guilaev A.M., Mukhina O.B., Sarach O.B.* Reactive magnetron evaporation on direct current of  $C\Box\Box_2$  films intended for gas sensors (in Russian). Proceedings of the 11<sup>th</sup> International Conference on gas discharge physics. Ryazan, 2002.
- ❑ *Polyakov V., Panfilov D., Bulatov O.* Electronic ballast for high-pressure sodium lamps. Proceedings of the 45th International Power Quality Conference. Nuremberg, May 14 – 16, 2002.

## ■ Dissertations

- ❑ *Moscovka A.A.* Autonomous voltage invertors 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

## ■ Patents

- ❑ *Bonomorsky O.I., Voronin P.A.* Semiconductors switch device with field control. 30.07.2002.

## ■ 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 "Proector - electrotehnika", Moscow
- ❑ "Golovnoe konstruktorskoe buro "Projector", Moscow
- ❑ NIKFI, Moscow
- ❑ NICTL, Shatura
- ❑ Organization "BLESK-NVF", Moscow
- ❑ VEI named Lenin V.I., Moscow
- ❑ ABB Metronika, Moscow

## ■ 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)

Tel.: (095) 362-7168  
E-mail: PPE-all@mpei.ru

The department has on its staff  
17 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.
- Electronic microscopy and scanning tunneling microscopy  
Prof. A.I. Popov, Prof. E.N. Voronkov
- 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  $A_2B_6$   
Prof. N.K. Morozova
- MOS-structures and field-effect silicon transistors
- 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 of the 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 phenomena induced by a carrier heating in a channel of MOS-transistors, and methods development for control of manufacturing MOS VLSI firm 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., Popov I.A., Vorontsov V.A.* Features structural modification levels of non-crystalline semiconductors and its application areas (in Russian). *Fizika i tekhnika poluprovodnikov*, 2001, vol. 35, no. 6, p. 665.
- *Popov A.I.* Structural modification and characteristics stability of non-crystalline semiconductor (in Russian). *Proceedings of the International Symposium "Noise and degradation processes in semiconductor devices"*, Moscow. MPEI Publisher, 2001, p. 138.
- *Popov A.I.* Application possibilities of structural modification to glassy semiconductors. *Proceedings of the 19<sup>th</sup> International Congress on Glass*. Edinburgh. Extended abstracts. 2001, p. 777.
- *Popov A.I., Vasilieva N.D., Vorontsov V.A.* Films characteristics of amorphous hydrogenated carbon obtained by ion-plasmas evaporation (in Russian). *Izvestiya vuzov. Elektronika*, 2001, no. 4, p. 5.
- *Morozova N.K., Karetnikov I.A., Blinov V.V., Gavrischuk E.M.* Luminescence centers investigations created by copper and oxygen presence in ZnSe (in Russian). *FTP*, 2001, vol. 35, no. 1, p. 25.
- *Zhukov D.V., Blinov V.V., Morozova N.K.* Luminescence Cu-centers investigation for ZnSe (in Russian). *FTP*, 2001, vol. 35, no.1, p. 76.
- *Morozova N.K., Karetnikov I.A., Blinov V.V., Gavrischik E.M.* Infra-red ZnSe luminescence investigation at copper and oxygen content (in Russian). *FTP*, 2001, vol. 35, no. 5, p. 534.
- *Oxygen* alloying influence on infra-red transmission and cathode luminescence of ZnSe (in Russian). N.K. Morozova, V.V. Blinov, E.M. Gavrischik et al / *Neorganicheskie materialy* 2001, vol. 37, no. 12, p. 322.
- *Fairushin A.R.* "Research of a microplasma breakdown in the film of glassy semiconductor. *Journal of Optoelectronics and Advanced Materials*. 2001, vol 3, no 2, p. 499.
- *On the road to the artificial nose*. M.A. Zenina, A.V. Titov, O.B. Sarach, A.M. Guljaev, O.B. Muchina, I.B. Warlashov / *Proceedings of the 2<sup>nd</sup> Siberian Russian student workshop on EDM'2001*, section 1, 3-76 July, Erlagol. P. 33.
- *Shnitnikov A.S.* Correlation analysis usage for products parameters determination at high casual errors (in Russian). *Izmeritelnaya tekhnika*. 2001, no. 2, p.17.
- *Shnitnikov A.S.* Direct loss resistance determination for switching UHF diodes (in Russian). *Izmeritelnaya tekhnika*. 2001, no. 8, p. 60.
- *Popov A.I.* Structural characteristics and structural modification of non-crystalline semiconductors. *Journal of Optoelectronics and Advanced Materials*. V. 4, no. 3, Sept. 2002, p. 347.
- *ZnSe* luminescence at copper alloying (in Russian). N.K. Morozova, V.V. Blinov, E.M. Gavrischik et al. *Neorganicheskie materialy*. 2002, vol. 38, no. 6, p. 674.
- *Infra-red* Cu centers converting and SA luminescence of CVD-ZnS (Zn-Se) at high pressure and temperature (in Russian). *Proceedings of the International Conference "Optics, optoelectronics and technologies" (O<sup>2</sup>T 2002)*. N.K. Morozova, V.V. Blinov, E.M. Gavrischik et al. *Ulianovsk*, 2002. p. 1.

- *Guliaev A.M., Miroshnikova I.N., Nediruba D.A.* Noise spectroscopy application for reliability prediction of infra-red radiation receivers on the base of indium antimonide (in Russian). Proceedings of the XVII International Conference on photoelectric and night vision devices. 2002 □. Moscow, p. 56.
- *Shnitnikov A.S., Gudkova N.B.* UHF regulator of low power level with wide dynamic range (in Russian). Proceedings of the 12 International Crimea Conference «UHF technique and telecommunications technologies». Sevastopol, Ukraine, 2002, p. 148.
- *Guliaev A.M.* From microelectronics to nanoelectronics (in Russian). Noise and degradation processes in semiconductor devices. □oscow, MPEI Publisher, 2002, p. 18.
- *Properties* characteristics of thin-film sensors on the base of  $\text{SnO}_2$  obtained by reactive magnetron evaporation (in Russian). Sarach O.B., Gyliaev A.M., Warlashov I.B. et al // "Noise and degradation processes in semiconductor devices" □oscow, MPEI Publisher, 2002, p. 131.
- *Titov A.V., Guliaev A.M., Mukhina O.D., Warlashov I.B.* Noise and generation phenomena in sensor on the base of  $\text{SnO}_2$  with Cs, In adding and catalic Pt coating (in Russian). "Noise and degradation processes in semiconductor devices" □oscow, MPEI Publisher, 2002, p. 137.
- *Khirin V.N., Guliaev A.M., Burunov A.G., Mirnia S.N.* Urbach's rule in absorption spectra and photo current spectra in polychrictalline films. "Noise and degradation processes in semiconductor devices" □oscow, MPEI Publisher, 2002, p. 229.
- *Voronkov E.N.* Pulsed breakdown of chalcogenide glassy semiconductor films. Journal of Optoelectronics and Advanced Materials. V. 4, no. 3, Sept. 2002, p. 793.
- *Distinction of* lifetime damage in silicon diode layers at various radiation processing. Potapchuk V.A., Fechretdinov R.R., Kokin S.A. et al // Proceedings of the 55th International Power Electronics Conference 2002 "PCIM-2002" (May 14-16, 2002, Nurnberg, Germany), PE-2, p. 293.

## ■ Dissertations

- *Kolobaev V.V.* Research of thin-film structures on the basis CdTe and their application in solar cells. Cand. Sci. (Tech.) Dissertation, 2001.
- *Vorontsov V.A.* Structural modification of properties of amorphous Carbon. Cand. Sci. (Tech.) Dissertation, 2002.

## ■ Partners

- Science and production association "Sapphire", Moscow
- Science and production association "Pulsar", Moscow
- "The Moscow plant Sapphire ", Moscow
- The research institute of materials Technology, St-Petersburg
- The research institute of Molelectronics, 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 semiconductors 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

# DEPARTMENTS UNDER THE SUPERVISION OF THE UNIVERSITY ADMINISTRATION

## Departments:

Department of History and Culturology .....	8.2
Department of Philosophy, Politology and Sociology .....	8.4

# DEPARTMENT OF HISTORY AND CULTUROLOGY

Tel.: (095) 362-7423

The department has on its staff  
18 lecturers

Head of Department:  
Marina I. SMIRNOVA  
Dr. Sci. (Hist.), Prof.

## SECTION OF HISTORY

### ■ Main Lines of Research

---

Research supervisors

- Analysis of the socio-historical experience of Russia and of the Russian model of development in the present-day global context  
Prof. M.I. Smirnova, Prof. G.V. Petryakov
- The history of political parties and movements in Russia  
Prof. M.I. Smirnova
- Development of historiographic problems of XX-century Russia  
Prof. A.A. Chernobaev
- Computer technologies in education  
Assoc. Prof. I.A. Zhuravlev, Assoc. Prof. G.Z. Vinogradova

### ■ Agreements, Contracts, Projects Supported by State Budget

- Russian historiography in XX century
- World civilizations: theory, history, culture
- Socio-cultural sources of stalinism. Historiography
- Continuous education concept: "Humanitarian Education in Medium School—Technical High-Education Institution"
- Preparation of a multimedia training textbook (CD-ROM) on the history of culture for a distant education system on "The World of Middle Ages: Spiritual Sources and Cultural Traditions"

### ■ Key Publications

- *Chernobaev, A.A.*, Russia's Historians: Biographies (in Russian), Moscow: ROSPEN Publisher, 2001.

## ■ SECTION OF CULTUROLOGY

### Main Lines of Research

- The culture of Byzantium and Ancient Russia

---

Research supervisors

Assoc. Prof. G.Z. Vinogradova

- The irrational in culture

Sr. Lecturer A.N. Mikhailov

- The religious aspects of culturological knowledge

Assoc. Prof. T.V. Kostyleva

- Russian culturology on the borderline between XIX and XX centuries

Assoc. Prof. I.A. Podkopaeva

### ■ Key Publications

- *Kostyleva, T.V.*, Futurology and Culture (in Russian), Moscow. MPEI Publisher , 2002.

# DEPARTMENT OF PHILOSOPHY, POLITOLOGY, AND SOCIOLOGY

Tel.: (095) 362-7707, (095) 362-7654, (095) 362-7915

Fax: (095) 362-7209

The department has on its staff  
30 lecturers and  
2 research workers

Head of Department:  
Andrei L. ANDREEV  
Dr. Sci. (Philos.), Prof.,  
Member of the Academy  
of Political Sciences

## ■ Main Lines of Research

### Research supervisors

- |  |                                |
|--|--------------------------------|
| □ Modern society: Russia in global context   | Prof. A.L. Andreev             |
| □ Present-day problems of social philosophy  | Prof. G.S. Aref'eva            |
| □ Philosophical problems of religion   | Prof. V.S. Kostelov            |
| □ Culture, language, cognition   | Prof. L.I. Nasonova            |
| □ Sociology of education; social and philosophical aspects of higher education development in Russia | Prof. A.L. Andreev             |
| □ Philosophy and history of science and technology   | Prof. E.N. Ivashov             |
| □ Professional (including engineering) ethics  | Assoc. Prof. N.M. Malinovskaya |
| □ Political culture  | Assoc. Prof. I.Ya. Vorob'eva   |
| □ Comparative politology   | Assoc. Prof. S.L. Chepel'      |
| □ Methods of sociological investigations   | Assoc. Prof. M.Yu. Kuz'minov   |

## ■ Agreements, Contracts, Projects Supported by State Budget

- Analysis and development of the synergetic paradigm of prediction and simulation of socio-cultural processes
- Ethnophilosophy or philosophy of ethnos
- Theoretical principles of information processes (information processes in university environment)
- Analysis of the practical competence of students of the Moscow Power Engineering Institute in using computer equipment
- Continuous humanitarian education in the "medium school—technical institute" segment
- Humanitarian education and cultural practice of students of the Moscow Power Engineering Institute

## ■ **Key Publications**

- ▣ *Andreev, A.L.*, Political Psychology (in Russian), Moscow. Mir Publisher, 2002.
- ▣ *Klyucharev, G.A.*, Continuous Education under Conditions of Transformation (in Russian), Moscow. IKS Publisher (Inst. of Integrated Social Studies), 2002.

## ■ **Partners**

- ▣ Russian Academy of Education (Division of Education and Culture), Moscow
- ▣ Philosophical Society of the Russian Federation, Moscow
- ▣ Institute of Philosophy, Russian Academy of Sciences (IFRAN), Moscow
- ▣ Institute of Integrated Social Studies, Russian Academy of Sciences, Moscow
- ▣ Institute of Sociology, Russian Academy of Sciences, Moscow
- ▣ Institute of Applied Mathematics, Russian Academy of Sciences (philosophical and sociological departments, department of psychology), Moscow
- ▣ Center of Social Sciences of Moscow State University, Moscow
- ▣ Russian State Humanitarian University, Moscow
- ▣ International Independent Environmentalist-and-Politological University (MNEPU), Moscow
- ▣ Specialized departments of Moscow State Technical University and Moscow Aviation Institute, Moscow
- ▣ University of Communication and Informatics, Moscow

**IZNOSOSTOIKOST' (WEAR RESISTANCE)  
SCIENTIFIC CENTER  
OF MOSCOW POWER ENGINEERING  
INSTITUTE (TECHNICAL UNIVERSITY)**

# SCIENTIFIC CENTER OF MOSCOW POWER ENGINEERING INSTITUTE (TECHNICAL UNIVERSITY) "IMPROVING THE WEAR RESISTANCE OF POWER-GENERATING EQUIPMENT OF POWER PLANTS"

Tel.: (095) 362 77 18, (095) 362-7578

Fax: (095) 362-7578

E-mail: inc@inc.mpei.ac.ru

The Center has on its staff  
14 research workers,  
12 engineers and technicians,  
and 3 Ph.D. students

Director of the Scientific Center:  
Vyacheslav A. RYZHENKOV  
Dr. Sci. (Tech.), Prof.,  
Corresponding Member of the Academy  
of Environmental Engineering

## ■ Main Lines of Research

### Research supervisors

- Corrosion protection of boiler circuits of heat-and-power equipment of steam and nuclear power plants and boiler houses, as well as of various pipelines (heating mains, greenhouses, etc.)  
Prof. V.A. Ryzhenkov
- Environmental monitoring by way of determining the concentration of surfactants in various aqueous media  
Prof. V.A. Ryzhenkov
- Increasing the service life and reliability of operation of power-generating equipment through the use of highly efficient wear-resistant coatings  
Sr. Researcher G.V. Kachalin
- Corrosion protection of metal surfaces of equipment and metal structures  
Sr. Researcher S.I. Pogorelov
- Energy saving by removing accumulated deposits and prevention of new deposits on heat-exchange surfaces of equipment  
Chief Researcher A.V. Kurshakov
- Removal of deposits from the surfaces of boiler circuits of power plants  
Chief Researcher A.V. Kurshakov
- Determination of the erosion resistance of structural materials under conditions of their high-rate interaction with liquids  
Sr. Researcher A.A. Bodrov
- Determination of corrosion resistance of materials and protective coatings  
Sr. Researcher S.I. Nefedkin
- Increasing the safety of operation of power-generating and other objects  
Chief Researcher A.V. Volkov
- Hydrodynamic investigation of the flow passage of dynamic pumps and development of methods of increasing the operating reliability of the power plants pumping equipment  
Chief Researcher A.V. Volkov
- Investigation of the working capacity of power plants hydraulic circuits  
Chief Researcher A.V. Volkov
- Increasing the corrosion resistance of structural materials under conditions of long-term storage of spent nuclear fuel  
Sr. Researcher K.G. Gadzhiev

## ■ **Agreements, Contracts, Projects Supported by State Budget**

- Full-scale testing of anti-erosion coating of T-100-130 turbine last stage rotor blades
- Development of an environmentally “sparing” technology of removing deposits from the tubular surfaces of steam boilers of steam power plants with simultaneous preventive treatment of equipment in a unified technological cycle
- Development of the concept and technological principles of protection of large-sized components of thermal power plants heat-engineering equipment under conditions of surface wear caused by diverse effects
- Development of a technology and mobile facility for corrosion protection of heat-engineering equipment of thermal power plants that is under repair or in storage
- Development of technologies and components of equipment characterized by a high energy efficiency for household and municipal uses
- Realization of the technology developed at Moscow Power Engineering Institute for corrosion protection and for raising the operating efficiency and reliability of heating systems of residential buildings
- Development of estimation methods for the operating reliability of condensate, supply-line, and booster pumps of thermal power plants, and the determination of the residual service life and optimal periods between repairs
- Realization of the corrosion protection technology for the inner surfaces of heat-supply systems pipelines using a surface-active inhibitor of corrosion
- Investigation of high-rate processes of interaction between liquid droplets and the surface of important units of power-generating equipment
- Development of a technology of structural materials corrosion resistance raising under conditions of spent nuclear fuel storage

## **Key Publications**

- □ *The Effect of Argon-Ion Treatment of Surfaces on the Erosion Resistance* (in Russian) / Ryzhenkov, V.A., Krainov, V.K., Pogorelov, S.I. et al. Prikl. Fiz., 2001, no. 2, p. 71.
- *Investigation of the Anti-Corrosion Properties of Wear-Resistant Coatings for the Protection of the Working Blades of Steam Turbines of Large Power-Generating Plants* (in Russian) // Ryzhenkov, V.A., Pogorelov, S.I., Nefedkin, S.I. et al., Vestn. Mosk. Energ. Inst., 2001, no. 5, p. 38.
- *Conservation of turbo-machines by aqueous emulsion of octadecylamine* (in Russian) // Kushakov, A.V., Dubrovskii, I.Ya., Polevoi, E.N. et al. Energoberezh. Vodopodgot., 2001, no. 3, p. 48.
- *Enhancement of Heat Transfer and Corrosion Protection* (in Russian) // Reutov, B.F., Ryzhenkov, V.A., Pyzhov, I.N., and Arbuzov, V.V., in Rossiiskie energoeffektivnye tekhnologii. Energoeffektivnye tekhnologii v promyshlennosti (Russian Energy-Efficient Technologies: Energy-Efficient Technologies in Industry), 2002, issue 1(3), p. 28.
- *About the problem of efficiency of deposits removing, sanitation, and corrosion prevention of equipment steam-water paths surfaces* (in Russian) // Kurshakov, A.V., Dobrokhотов, E.A., Ryzhenkov, V.A., and Shamko, V.N., Teploenergetika, 2002, no. 1, p. 44.
- *Analysis of the Effect of Local Supply-Line Resistances on the Cavitation Characteristics of Power Pumps* (in Russian) // Volkov, A.V., Davydov, A.I., Pankratov, S.N., and Pomortsev, M.Yu., Energoberezh. Vodopodgot., 2002, no. 3, p. 39.
- *Ryzhenkov, V.A., Kurshakov, A.V., and Volkov, A.V., Universal Technology of Cleaning and Raising the Efficiency of Heat-Exchange Equipment* (in Russian),

Kholod. Biznes, 2002, no. 6, p. 36.

- ❑ *Octadecylamine* Treatment of Steam Power Boilers (in Russian) // Dubrovskii, I.Ya., Kurshakov, A.V., Ryzhenkov, V.A. et al., Energoberezh. Vodopodgot., 2002, no. 1, p. 57.

## Patents

- ❑ *Kurshakov, A.V., Ryzhenkov, V.A., Pyzhov, I.N., and Arbuzov, V.V.*, A Method of Chemical Cleaning of the Surfaces of Heat-Engineering Equipment from Depositions, RF Patent no. 2,175,817, Byull. Izobret., 2001, no. 13.

## Partners

- ❑ Astrakhanenergo utility company, Astrakhan, Russia
- ❑ Western Ural Association of Power Engineers, Perm, Russia
- ❑ Vologdaenergo utility company, Vologda, Russia
- ❑ Gidromash company, Moscow
- ❑ Dal'energo utility company, Khabarovsk, Russia
- ❑ Baikov Institute of Metallurgy and Materials Studies, Russian Academy of Sciences, Moscow
- ❑ Kamchatenergo utility company, Petropavlovsk-Kamchatskii, Russia
- ❑ Kaluga Turbine Works (OAO KTZ), Kaluga, Russia
- ❑ Lipetskenenergo utility company, Lipetsk, Russia
- ❑ Leningrad Metal Works, St. Petersburg, Russia
- ❑ Moscow Committee for Science and Technology joint-stock company, Moscow, Russia
- ❑ Mosenergo utility company, Moscow
- ❑ Mosgorteplo State Unitary Enterprise, Moscow
- ❑ Ministry of Industry, Science, and Technologies of the Russian Federation, Moscow
- ❑ NPO TsNIITMash scientific-and-production association, Moscow
- ❑ Permenergo utility company, Perm, Russia
- ❑ POMPA company, Moscow
- ❑ SIGMA company, Lutín, Czech Republic
- ❑ Fuel-and Energy Administration of the Government of Moscow, Moscow
- ❑ Karpov Research Institute of Physical Chemistry Federal State Unitary Enterprise, Moscow
- ❑ Tsentrenergo utility company, Moscow
- ❑ Ministry of Electroprireda Srbije, Belgrade, Serbia
- ❑ Ministry of Electroprireda na Makedoniyu, Skopje, Macedonia
- ❑ Elektronasosnyi agregat (Electric Pump Unit) company, Moscow
- ❑ OAO RAO EES Rossii (Unified Power System of Russia) company, Moscow
- ❑ PO Mayak production association, Federal State Unitary Enterprise, Chelyabinsk, Russia
- ❑ Russian Federal Nuclear Center—All-Russia Research Institute of Experimental Physics (VNIIEF), Sarov, Nizhni Novgorod Region, Russia

# **INNOVATION-TECHNOLOGY CENTER OF THE SCIENCE PARK OF THE MOSCOW POWER ENGINEERING INSTITUTE**

<b>Innovation-Technology Center .....</b>	<b>10.2</b>
<b>IVK-Sayany company .....</b>	<b>10.4</b>
<b>Mediana-Fil'tr scientific-and-production company .....</b>	<b>10.5</b>
<b>Mera company .....</b>	<b>10.6</b>
<b>Neirokom company .....</b>	<b>10.7</b>
<b>TAS company .....</b>	<b>10.8</b>
<b>TEKON company .....</b>	<b>10.9</b>
<b>ENTEK company .....</b>	<b>10.11</b>
<b>ESKOTEK company .....</b>	<b>10.12</b>
<b>NPP TSIKL PLYUS company .....</b>	<b>10.13</b>

# INNOVATION-TECHNOLOGY CENTER

Tel.: (095) 362 74 15, (095) 362-7088, (095) 273-0287

Fax: (095) 362-7415

E-mail: spark@sp.mpei.ac.ru

Internet: www.sciencepark.mpei.ru

General Director:  
Nikolai D. ROGALEV  
Dr. Sci. (Tech.), Prof.

## ■ 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

- Automatic system of energy saving in buildings
- Problems in and prospects for the development of the training-and-innovation complex (TIC) at Moscow Power Engineering Institute
- Investigation of innovation companies growth stages with a view to predicting the economic development of a region (based on examples provided by environmental studies, electronics, instrument making, and medicine)
- Investigation of atmospheric pollution with industrial and vehicle emissions and assessment of economic damage
- Development and pilot realization of managerial, economic, and technological measures in zones of high energy efficiency
- Development of efficiently managed objects of energy economy in the municipalities of the Central Administrative District of Moscow

## ■ Key Publications

- *Russia's Innovation Companies' Growth Stage Investigation*. Rogalev, N., Bortnik, Y., Polyakov, S. et al // Moscow Power Engineering Institute. Fund for Assistance to Small Innovative Enterprises, in Proc. 6th Int. Conf. on Technology Innovation and Policy, Kansai, Japan, 2002.
- *Baidakov, S.L., and Rogalev, N.D.*, An Integrated Territorial Approach to Raising the Energy Efficiency of Urban Public Services (in Russian) // Energoberezhenie, 2002, no. 1, p. 17.
- *Rogalev, N.D., Tabachnyi, E.M., and Akhmedzhanova, O.P.*, Analysis and Development of Models of Diffusion of Products (in Russian) // Vestnik Mosk. Energ. Inst., 2002, no. 4, p. 57.
- *Klimenko, A.V., and Rogalev, N.D.*, First Steps towards Developing the Russo-Chinese Technopark (in Russian) // Papers to the All-Russia scientific-and-practical conference on the Current Status and Prospects for Development of Innovation Activities in the Russian Educational System, Krasnodar, 2002, p. 81.
- *Rogalev, N.D., Gasho, E.G., Kurdyukova, G.N., and Kuz'kina, E.V.*, On Rationalizing the System of Transport and Distribution of Thermal Energy in Large Cities (in Russian) // Abstracts of papers to the electronic conference on the subprogram on Fuel and Power Industry, Moscow. MPEI Publisher, 2002, p. 46.

### ■ **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

## IVK-SAYANY COMPANY

Tel.: (095) 362-7299, (095) 362-7002  
Tel./Fax: (095) 918-0960, (095) 918-0500  
E-mail: root@sayany.ru

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 stands  
I.V. Kuznik
- Development of automatic control systems of heat consumption  
I.V. Kuznik
- Development of software support for the automation of metering of heat and heat-transfer agent  
V.V. Gorbunov

### ■ Agreements, Contracts, Projects Supported by State Budget

- Agreements and contracts for the delivery of heat- and water meters and calibration equipment 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 doctor of science  
and five Ph.D. on its staff

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

Cand. Sci. (Phys.-Math.) A.R. Sidorov

- 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 a DVS2-M/800 two-stage system of reverse osmosis for Podolsk Chemical-and-Metallurgical Works
- Development of the production technology and structures of facilities for the preparation of deionized water
- 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
- Hoffmann-la Roche, Switzerland
- Moscow Power Engineering Institute (MPEI), Moscow
- Moscow Institute of Physics and Technology (MFTI), Moscow
- Innovatsionnoye Agentstvo (Innovation Agency) non-profit partnership, Moscow
- All-Russia Institute of Experimental Medical Equipment, Moscow
- Osmonix, USA

# **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 of simulation and design of the structural parameters of resilient elements of force sensors  
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, manufacture, and delivery of an automatic system for control of MD100-MD200 batch-weighing scale for flour
- Development, manufacture, and delivery of a batch-weighing system for the automation of the process of packing aqueous paints and glues with a high viscosity and increased abrasiveness
- Development and organization of quantity production of force sensors and electronic converters for universal electronic scale with a maximal weighing limit of 600 kg
- Manufacture and delivery of desk-mounted electronic scale with a maximal weighing limit of 15 and 30 kg and of floor-mounted scale with a maximal weighing limit of 600 kg

## **Partners**

- MMPO Salyut production association, Moscow, Russia
- AO Institut Hidroproyekt (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

- General- and special-purpose radiotelemetry equipment  
Technical Director 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 efficiency of operation  
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 Neurokom 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 electropneumatic 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 telemetry equipment intended for testing and for maintaining standard operation of space, rocket, and aircraft equipment
- Special equipment for monitoring moving objects
- The enterprise has production areas of its own. 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 certified. Appropriate inspection and acceptance of the products is provided.

# TAS COMPANY

Tel./Fax: (095) 362-7814, (095) 414-5765, (095) 362-7098

E-mail: info@tasltd.ru

tctas@rol.ru

Internet: www.tasltd.ru

The department 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 CASTOLIN S.A. and TAFA Inc.
- Delivery of equipment and materials for repair, reclamation, and protection of components of production equipment
- 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 (metallization) (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 HVOF processes)
- Facilities for hydraulic chipping-off of sprayed coatings

# TEKON COMPANY

Tel.: (095) 361-9936, (095) 730-4112 (ext. 145)

Fax: (095) 362-7454

E-mail: [info@tecon.ru](mailto:info@tecon.ru)

Internet: [www.tecon.ru](http://www.tecon.ru)

The department has 5 Ph.D.  
and 18 engineers on its staff

General Director:  
Vladimir N. SHUMILOV  
Ph.D. (Tech.)

## ■ Main Lines of Research

---

Research supervisor

D.P. Timoshenko

- ❑ Development of programmable microprocessor-based control devices
- ❑ Development of intelligent sensors
- ❑ Development of software/hardware means for local production networks
- ❑ Development of system and applied software for automatic systems of process control
- ❑ High-efficiency electronic production
- ❑ Design and manufacture of integrated cabinets for automatic equipment
- ❑ System integration in heat-and-power engineering
- ❑ The TEKON company specializes in development and manufacture of means and systems of integrated automation in power engineering, industry, and agriculture
- ❑ The company has developed a set of standard system solutions for the automation of power-engineering objects; the technical basis for these solutions is provided by a complex of software/hardware means for the construction of distributed automatic systems of process control. The complex is based on quantity-produced process controllers of own design. By their information capacity, these controllers are divided into three families, namely: MFC — multifunctional trunk-modular controllers of high information capacity (up to 750 channels); TKM51 and TKM52 — monoblock controllers of medium information capacity (up to 200 channels); and TKM21 — PID (proportional + integral + derivative) controllers
- ❑ All controllers are integrated into local production networks and connected to different industrial computers. In combination with a wide range of supplementary equipment and system software, the controllers make it possible to develop distributed automatic systems of process control for objects of varying scale and complexity

## ■ Examples of standard solutions include:

- ❑ automatic system of process control for a district-heating station
- ❑ automatic system of process control for a central heat-supply station
- ❑ automatic system of process control for a boiler unit
- ❑ automatic system of process control for a shop of chemical water treatment
- ❑ automatic system of process control for a circulation pumping station, etc.
- ❑ Successful experience in the introduction and operation of such systems makes it possible to develop similar automatic systems of process control in the shortest periods of time and at minimal cost with guaranteed quality

## Partners

- ▣ GOSAN, Moscow
- ▣ Del'fin-Informatika company, Moscow
- ▣ METRAN, Chelyabinsk
- ▣ NVT-Avtomatika company, Moscow
- ▣ SUNETO, Kemerovo
- ▣ Teploenergoremont, Moscow
- ▣ UralVNIPlenergoprom research institute, Ekaterinburg
- ▣ TsNIIKA, Moscow
- ▣ Energoavtomatika, Ufa

## Unique Equipment

- ▣ High-precision laboratory instruments for measuring electrical quantities, calibrating devices
- ▣ Equipment for high-efficiency electronic assembly
- ▣ Stand for general and metrological testing of articles in a wide temperature range

Tel.: (095) 273-0304

Fax: (095) 362-7370

E-mail: entek@inage.ru

The company has 11 persons on its staff

General Director:

Sergei V. ARIANOV

Ph.D. (Tech.)

## ■ Main Spheres of Activities

### Scientific supervisors

- Development of new structures and updating of the flow passage of turbine units and individual components of heat-generating equipment of cogeneration power plants  
Prof. A.E. Zaryankin
- Manufacture of new structures and spare parts of turbines and heat-generating equipment of cogeneration power plants  
S.V. Yakimychiev
- Development and commercialization of software products, including accounting software package for various enterprises. Delivery and installation of local computer networks  
Ph.D. (Tech.) S.V. Arianov

## ■ Agreements, Contracts, Projects Supported by State Budget

- Manufacture and delivery of packing for RVP-98 in the form of a stack of pebble grates
- Manufacture and delivery of high-pressure relief adjusting valves for K-500-166 turbine
- Manufacture and delivery of a set of driving pins with a rotating sleeve for RVP-54, 68, 98 drive
- Delivery and installation of local computer network, introduction of integrated accounting software at an enterprise, training of personnel

## ■ Partners

- Department of steam and gas turbines of Moscow Power Engineering Institute (Technical University), Moscow
- Branch of TETs-21 cogeneration plant of Mosenergo utility company, Moscow
- Branch of TETs-26 cogeneration plant of Mosenergo utility company, Moscow
- Samaratransgaz company, Samara, Russia
- 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](mailto:escotech@sp.mpei.ac.ru)

Internet: [www.sciencepark.mpei.ru](http://www.sciencepark.mpei.ru)

The company has 25 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
- ❑ Development of electronic control units for pumps with frequency converters
- ❑ Design and installation of Teplokomfort (Heating Comfort) heat-demand control systems for boiler rooms of central heat-supply stations, individual heating stations, and cottages
- ❑ 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 Central Administrative District of Moscow
- ❑ Development of an integrated plan for heat saving for Teploset' enterprise in Domodedovo near Moscow

# NPP TSIKL PLYUS COMPANY

Tel.: (095) 362-7996, (095) 362-7576

E-mail: [ovn@aep.mpei.ac.ru](mailto:ovn@aep.mpei.ac.ru)

The company has  
11 persons on its staff

General Director and Scientific Supervisor:  
Vadim N. OSTRIROV  
Ph.D. (Tech.), Assoc. Prof.

## ■ Main Spheres of Activities

- Development of a range of electronic converters for an electric drive utilizing modern components
- Research and development of controllable induction-motor and switched-reluctance electric drives
- Development work, 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 types of converters 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 32.5 kW
- Complete energy-saving equipment for pumps for urban water supply and for pumping out sewage with a capacity of up to 320 kW

**CENTER OF HIGH TECHNOLOGIES**  
**DEPARTMENT OF LOW TEMPERATURES**

# 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 research workers,  
and 12 Ph.D. students

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

## ■ Main Lines of Research

### Research supervisors

- Development of systems for capsulation of compressed gases, including hydrogen, into hollow mono-dispersed micro spheres  
Prof. E.V. Ametistov, Prof. A.S. Dmitriev
- Development of radiated droplet heat exchangers for space applications  
Prof. A.S. Dmitriev
- Research of heat exchange and currents hydrodynamics of cryogenic liquids in channels  
Prof. A.V. Klimenko, Sr. Researcher A.M. Sudarchikov
- Study in non-equilibrium processes of transfer on multi-phase surfaces of gas-condensate  
Prof. A.P. Krukov
- Research of currents of gas-duct mixtures in non-equilibrium conditions  
Prof. A.P. Krukov
- 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 capillary instabilities of jets in non-equilibrium conditions  
Assoc. prof. A.F. Ginevskii
- The thermodynamic analysis and development of low temperature equipment  
Prof. V.M. Brodyansky, Assoc. prof. A.V. Grachiov
- Development of corpuscular cryogenic targets for accelerators technique  
Assoc. prof. A.V. Bukharov
- 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
- Experimental researches of cryogenic corpuscular targets
- Manufacturing technology for micro-spheres from rare-earth metals and alloys

## ■ **Key publications**

- *Ametistov E.V., Dmitriev A.S.* Monodisperse systems and technologies (in Russian). MPEI Publishers, 2002.
- *Kemenov V.N., Nesterov S.B.* Vacuum technique and technology (in Russian). □ PEI Publisher, 2002.
- *Agapitov E.B., Grachiov A.B.* Calculation and design of air-separating plants (in Russian). MGTU Publisher, Magnitogorsk, 2002.
- *Stoliarov V.V., Zilova O.S., Guschina Yu.Yu., Filatov D.O.* Investigation of tritium atmosphere influence on activated carbon surface (in Russian). Research Session of MIFI-2002. Collection of scientific papers, vol. 4. MIFI Publisher, 2002, p. 183.
- *Stoliarov V.V., Zilova O.S., Kuz'kin V.I.* Spectroscopic measurements peculiarities in scanning tunnel microscopy (in Russian). Research Session of MIFI-2002. Collection of scientific papers, vol. 4. MIFI Publisher, 2002, p. 184.
- *Nesterov S.B., Kemenov S.B., Zilova O.S., Anufrieva I.V.* Investigation of sorbent surface topography with the aid of scanning probe microscopy methods (in Russian). Proceedings of 5<sup>th</sup> International Conference "Vacuum Technologies and Equipment". Kharkov: NSC "Kharkov Institute of Physics and Technology", 2002, p. 29.
- *Nesterov S.B., Zilova O.S.* Isotherms of helium-4 sorbtion on nitrogen and argon cryo-layer (in Russian). Proceedings of 5<sup>th</sup> International Conference "Vacuum Technologies and Equipment". Kharkov: NSC "Kharkov Institute of Physics and Technology", 2002, p. 35.
- *Kemenov V.N., Nesterov V.N., Kapustin E.N., Zilova O.S.* Investigation of surface structure of thin-film coatings by scanning probe microscopy method (in Russian). Proceedings of IX scientific conference "Vacuum science and technology". MGIEP Publisher, 2002, p. 153.
- *Electro-physical* characteristics and topography of superfisial carbon-polimeric nano-structures (in Russian). Proceedings of IX scientific conference "Vacuum science and technology". V.M. Elinson, S.B. Nesterov, S.S. Zybenko, MGIEP Publisher, 2002, p. 384.
- *Zilova O.S., Kemenov V.N., Nesterov S.V., Saksaganskiy G.L.* Investigations of activated carbon surface with the aid of scanning probe microscope TMX-2100 "Accurex" (in Russian). Proceedings of 7<sup>th</sup> International conference "Engineering problems of thermonuclear reactors", 2002, p. 207.
- *Nesterov S.B., Androsov A.V., Bojarskiy M. Yu.* Low-Temperature snare working on choke cycle (in Russian). Proceedings of V international symposium "Vacuum technologies and equipment", Khar'kov, 2002, p. 54.
- *Androsov A.V., Vasil'iev Yu.K.J., Zilova O.S., Nesterov S.B.* Development and application of analysis methods for complex vacuum systems (in Russian). Proceedings of VII international conference "Engineering problems of thermonuclear reactors", Sankt-Petersburg, 2202, p. 205.

- ❑ *Bykov D.V., Nesterov S.B., Sabirzianov N.R.* Main parameters estimation of axis-symmetrical vacuum systems at the initial design stages (in Russian). Vacuum technique and technology, 2002, vol. 12, no. 1, p. 699.
- ❑ *Nesterov S.B.*, Cryo-evacuation of helium isotopes (in Russian). Proceedings of VII international conference "Engineering problems of thermonuclear reactors", Sankt-Petersburg, 2202, p. 218.
- ❑ *Development* and modernization of vacuum cryogenic pumps (in Russian). V.I. Liapin, A.V. Gromov, A.V. Smirnov, Proceedings of V international symposium "Vacuum technologies and equipment", Khar'kov, 2002, p. 286.
- ❑ *Nesterov S.B., Strogova T.S.* Calculation of complex pipelines conductivity (in Russian) // Vacuum technique and technology, 2002, vol. 12, no. 1.
- ❑ *Goloskokov V.V., Kemenov V.N., Nesterov S.B., Tvorogov I.V.* Sensors for vacuum measurements (in Russian). Proceedings on the 15<sup>th</sup> scientific conference "Sensors-202", Ukraine, 2002.
- ❑ *Nesterov S.B., Kemenov V.N., Anufrieva I.V.* Dry pumps. Status and perspectives (in Russian). Proceedings of IX scientific conference "Vacuum science and technology". MGIEP Publisher, 2002.
- ❑ *Artukhov I.V., Kemenov I.V., Nesterov S.B.* Biomedical technologies. Status review and main directions (in Russian). Proceedings of IX scientific conference "Vacuum science and technology". MGIEP Publisher, 2002.
- ❑ *Artukhov I.V., Kemenov I.V., Nesterov S.B.* Nano-technologies, biology and medicine. Proceedings of IX scientific conference "Vacuum science and technology" (in Russian). MGIEP Publisher, 2002.
- ❑ *M. Boiarski, O. Podtcherniaev, A. Lunin.* COMPARATIVE PERFORMANCE OF TWO-STAGE CASCADE AND MIXED REFRIGERANT SYSTEMS IN A TEMPERATURE RANGE FROM  $-100\text{ }^{\circ}\text{C}$  TO  $-70\text{ }^{\circ}\text{C}$  // Ninth Int. Refrigeration and Air Conditioning Conf. at Purdue, 2002, Jul.16-19. West Lafayette, IN, Paper R18.3, on CD.
- ❑ *Voronin V.P., Dmitriev A.S., Mikhailova I.A.* Development and application of informative-analytical methods and means for analysis, promotion and control of the perspective high technologies in the power engineering sector (in Russian). Energy Conservation – Theory and Practice. Collection of scientific works and reports. Amipress Publisher, 2002.
- ❑ *Bukharov A.V., Dmitriev A.S.* Investigation of the distribution function on velocity and charge of the mono-disperse drops using at heat and mass transfer equipment "liquid-gas" (in Russian). Third Russian National Conference on heat exchange, MPEI Publisher, 2002, Vol. 4, p. 239.
- ❑ *Bukharov A.V., Semenov A.A., Chernyshov V.P., Chernetskiy V.D.* Experimental installation for mono-disperse hydrogen granules generating (in Russian). Third Russian National Conference on heat exchange. MPEI Publisher, 2002, vol.5, p. 45.
- ❑ *Bliudov A.V., Ginevskiy A.F.* Capillary instability of the double-component stream thick with gas (in Russian). Third Russian National Conference on heat exchange. MPEI Publisher, 2002, vol. 8, p. 57.
- ❑ *Ginevskiy A.F., Fetisov F.A.* About interaction of spherical hot drop with the cold liquid surface (in Russian). Third Russian National Conference on heat exchange. MPEI Publisher, 2002, vol. 8, p. 61.
- ❑ *Ginevskiy A.F., Yakovlev A.F.* Numerical investigation of the process of forced capillary stream decay for viscous incompressible liquid (in Russian). Third Russian National Conference on heat exchange. MPEI Publisher, 2002, vol. 8, p. 19.

- ❑ *Kryukov A.P., Levashov V.Yu., Shishkova I.N.* Investigation of gas-dust mixture stream by methods of molecular-kinetic theory (in Russian). IFG, 2002, vol. 75, no. 4.
- ❑ *Kryukov A.P., Levashov V.Yu., Shishkova I.N.* Steam-gas mixture passing through dusted region with account of dust particles growing due to condensation (in Russian). Third Russian National Conference on heat exchange. Vol. 5, MPEI Publisher, 2002, p. 235.
- ❑ *Kryukov P., Levashov V.Yu., Shishkova N.S.* Strong Evaporation-Condensation In Gas-Dust Mixture. RGD23.

## ■ Partners

- ❑ Association «Cholodbyt», Moscow
- ❑ Company «Heliymash», Moscow
- ❑ Company «Cryogenmash», Balashicha, 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 Cryogenic Center
- ❑ Thermal-box for test of the refrigerating equipment
- ❑ Installation for study of behaviour He-isotopic films
- ❑ Installation for reception of cryogenic liquids drops
- ❑ Installation on reception of metal micro-spheres

# **RESEARCH DEPARTMENT “PROBLEMS OF CONTROL FOR ENERGY SAVING”**

# RESEARCH DEPARTMENT "PROBLEMS OF CONTROL FOR ENERGY SAVING"

Tel./Fax: (095) 362-7796

The department has on its staff  
4 research workers and 2 engineers

Head of Department:  
Boris F. REUTOV  
Cand. Sci. (Tech.), Lead. Researcher

## ■ Main Lines of Research

### Research supervisors

- Scientific fundamentals development for the energy and resource saving activities control, including investigation of the principles for creation federal, regional, and municipal energy saving programs, and principles for creation and application of regulatory, financial, and technological policy in the field of energy saving

Lead. Researcher B.F. Reutov

- Scientific bases development for teaching programs in the field of energy saving control including remote teaching on the basis of the modern information technologies

Lead. Researcher F.I. Pil'nenskii

- Research of the principles usage of ecologically pure substances and materials in advanced energy-efficient equipment

Lead. Researcher E.E. Ustyuzhanin

- Scientific bases development for energy efficient projects application with the use of the Kyoto protocol provisions to palatalize the global climate changes consequences

Lead. Researcher I.N. Pyzhov

## ■ Agreements, Contracts, Projects Supported by State Budget

- Demonstrating zone creation with high efficiency of energy utilization in various regions of Russia
- Thermal-physical properties investigation for ecologically pure quasi-azeotrope mixtures not influencing on Earth atmosphere
- Provisions realization problems of the UN frame convention on global climate changes in the field of power industry. Role of RF regions
- Energy efficient technologies in the XXI century
- Audit and control problems of energy resources consumption in administrative territorial regions and by industrial enterprises

## ■ Key Publications

- *Rykov, V., Ustjuzhanin, E., Magee, J., et al.*, Scaling Equation of State of HFC 134a in Wide Intervals of Pressure and Temperature, XVI European Conf. on Thermodynamic Properties, London, 2002.
- *Ustjuzhanin, E., Yata, J., Reutov, B., et al.*, Thermodynamic Properties of HFC 143a in a Wide region of the Critical Temperature, XVI European Conf. on Thermodynamic Properties, London, 2002.
- *Ustjuzhanin, E., Magee, J., Yata, I., et al.*, Scaling Models for Thermodynamic Properties of HFC 134a on the Coexistence Curve, XVI European Conf. on Thermodynamic Properties, London, 2002.
- *Ustyuzhanin, E.E., Reutov, B.F., Rykov, V.A. et al.*, Thermodynamic Properties of the Refrigerant R134A on the Equilibrium Curve Liquid-Vapor, Abstract of Papers, XII Int. Conf. "State Equations", Terskol, March 1 – 7, 2002.