

# Abstracts

## **ELECTROENGINEERING: Prominent events and great names**

*Baranov M.I.*

**Enriko Fermi – one of the founders of quantum statistics, electrodynamics and nuclear power engineering.**

A brief scientific-and-historical essay about the main achievements and discoveries in physics and

5 atomics made by the prominent physicist of the 20<sup>th</sup> century Enriko Fermi is given.

*Key words – physics, atomics, quantum statistics, electrodynamics, nuclear power engineering, scientific-and-historical essay.*

## **Electrical Mashines and Apparatus**

*Bibik O.V., Popovich O.M.*

**Increase in power efficiency of induction drives in quasi-static modes.**

An algorithm for performance increase reserves estimation at designing induction motors subject to real operation modes is introduced.

*Key words – induction motors, performance increase reserves, estimation.*

*Branspiz M.Yu.*

**To optimization problem formulation for a single-turn winding.**

Solutions of two optimization problems for a single-turn winding are given. It is shown that possible limitations on the initial data domain must be taken into account at an electromagnet optimization problem formulation, possible limitations.

*Key words – single-turn winding, optimization problem formulation.*

*Vas'kovski Yu.M., Gaidenko Yu.A., Natsik O.V.*

**Field theory based research on asynchronous motors under rotor parameters unsymmetry.**

Mechanical and operational characteristics of an asynchronous motor are simulated and studied by means of field theory methods in asymmetrical operation conditions under the rotor bars break. Peculiarities of electromagnetic field distribution in the active zone of the motor under presence of the damaged bars are analyzed.

*Key-words – asynchronous motor, rotor bars break, mechanical and operational characteristics.*

*Javoronkov M.A., Tkachenko S.A.*

**Diagnostics of every-day availability of electromechanical switching devices.**

The article is devoted to research into every-day availability of electromechanical switching units and analysis of results. The research is conducted at Electric and Electronic Apparatus Department of Moscow Power Engineering Institute (Technical University).

*Key words – electromechanical switching device, every-day availability, research.*

*Zablodsky N.N.*

**Interaction of a screw electro-thermo-mechanical converter and loading-cooling medium**

Processes of heat transfer and friction at interaction of electro-thermo-mechanical energy converters and loading-cooling medium are investigated.

*Key words – heat transfer, electro-thermo-mechanical converter, loading-cooling, medium.*

*Klimenko B.V.*

**International Electrical Vocabulary – Ukrainian prospects**

We continue publishing translation of selected parts from International Electrical Dictionary (IED), namely, section 441 - *Switchgear, control-gear and fuses*, into Ukrainian. In the paper, trans-

12 lation of section 441-14 – *Switching devices* - is presented.

*Key words – International Electrical Dictionary, section 441-14 – Switching devices, terms and definitions, translation into Ukrainian.*

*Konohov N.N.*

**Structural analysis and principle of symmetry at perfection of electric machine design.**

15 The history of theory of systems and theory of symmetry and their application to analysis of separate elements and units of electric machines (EM) are considered. Problems of EM design perfection are considered from the general points of theory of systems and theory of symmetry. Advantages of development of EM design with a radial-axial cooling system (a symbol of *n:m* symmetry) versus advantages of EM design with an axial cooling system are analyzed.

*Key words – electric machine design, principle of symmetry, structural analysis.*

*Moroz V.I.*

**Application of integral equations to simulation of controlled electromechanical systems.**

An example of integral equations application to simulation of controlled electromechanical systems is described in this paper. Analysis of accuracy and rational order of the numeric integration formula is made with implicit Adams methods.

*Key words – integral equations, controlled electromechanical systems, computer simulation, numeric methods accuracy.*

*Pavlenko T.P.*

**Influence of activation on electric contacts wear.**

23 In the paper, problems of activation process action on electric contact wear are considered. Taking into account features of the contact material, namely, thermionic activity at production and operation in real conditions, we make a conclusion that this contact composition can be used in electric apparatus with arc commutation.

*Key words – activation process action, electric contacts wear, thermionic activity.*

*Polyakov M.A.*

**A fuzzy regulator of power oil-immersed transformer cooling on the basis of disturbance factor change prediction.**

29 The structure and principles of a fuzzy regulator design for power oil-immersed transformer cooling are analyzed, the regulator employs linguistic variables of load current and environment temperature change prediction for the purpose of transformer isolation thermal wear minimization.

*Key words – power oil-immersed transformer, cooling, fuzzy regulator, disturbance*

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### factor change prediction.

*Popovich O.M., Golovan I.V.*

### Research on asynchronous motors with a massive ferromagnetic rotor at an increased power supply frequency.

A mathematical model for starting characteristic shaping for asynchronous motors with frequency-dependent parameters of the rotor is introduced; the model takes into account equivalent circuits of eddy-current losses in the stator and the rotor steel.

*Key words – asynchronous motor, starting characteristic shaping, mathematical model.*

*Rozanov Y.K., Kriukov K.V.*

### A power flow controller with a photovoltaic converter.

The paper introduces a scheme of a power flow controller with a photovoltaic converter on the dc side. Also, the paper discusses ways of efficiency increase for systems with photovoltaic converters. The work is conducted at Electric and Electronic Apparatus Department of Moscow Power Engineering Institute (Technical University).

*Keywords – multiconverter, power flow controller, photovoltaic converter, dc-dc converter.*

*Sebko V.V.*

### Research into transient process of air-layer heating between a heater and a product under the heater temperature alternation.

The transient process of air-layer heating between a heater and a product under the heater temperature alternation is studied. For a specific examples, solutions of a heat-balance equation describing transient heating of an air layer between the heater

51 winding and a product are found: a general stationary solution  $\Delta t_B^*$ , a partial nonstationary solution  $\Delta t_B^{**}$  and the complete decision  $\Delta t_B$ . Heating time dependences of the solutions are plotted.

*Key words – transient heating, heat-balance equation solutions, air layer, temperature alternation.*

*Shumilov Yu.A., Ponomarenko V.K., Kuz'min V.V., Demidyuk B.M.*

### Generator reliability control in nuclear, hydro- and heat power plants.

55 A necessity for on-line monitoring and diagnostics of large generators state so as to prevent the generators breakdown is justified. It is proposed to replace preventive maintenance by maintenance over significant abnormality of the reliability index.

*Key words – power plant generators state, on-line monitoring and diagnostics, maintenance.*

*Shurub Yu.V.*

### Improvement of operational properties of three-single-phase induction electric drives in starting modes.

57 A way of improvement of operational properties of three-single-phase induction electric drives through application of combination circuits is introduced, a mathematical model is developed to analyze dynamic processes resulting from circuit switching in such electric drives.

*Key words – induction electric drive, combination circuit, mathematical model, operational properties improvement.*

## Electrical Engineering: Theory

*Branspiz Yu.A.*

### Analysis of einstein's mental experiment on determination of magnetic field component acting on electric current in a ferromagnetic conductor.

It is shown that accounting of the disk thickness in Einstein's mental experiment does not allow making an unambiguous conclusion about description of force action on electric current in a magnetic material through magnetic field intensity or induction. The way of description of the magnetic field force action on the magnetic material turns out essential.

*Key words – electric current, magnetic material, Einstein's mental experiment, force.*

*Gorbachev M.N.*

### Geometric simulation of periodic inharmonic energy processes in controlled radio circuits and systems.

The paper presents and substantiates a principle of geometric simulation of periodic inharmonic energy processes in controlled radio circuits and

66 power supply systems for radio equipment with employment of mathematical theory of field.

*Key words – controlled radio circuits and systems, periodic inharmonic energy processes, geometric simulation, mathematical theory of field.*

*Pelevin D.E.*

### Initial data determination for electromagnetic devices of magnetic field control indoors

72 An initial data determination method for electromagnetic devices intended for magnetic field control indoors is developed. The method is based on direct measurement of magnetic field strength in specified indoor space at space mesh points. The initial array is processed by a cubic spline interpolation method. The initial data are represented quantitatively as matrixes and graphically as magnetic field distribution cards on parallel and orthogonal planes.

*Key words – magnetic field control, magnetic field strength, measurement, electromagnetic devices, cubic spline function.*

## Education Structure in

## "Electrical Engineering" and "Electromechanics"

*Godzhello A.G., Zhavoronkov M.A., Kalashnikova A.V., Nechaev D.N.*

### Creation of a universal training test bench for research on low-voltage apparatus

The work is devoted to development of a test bench for research on low-voltage apparatus. The bench constituent elements and research done on

77 the bench are described. This project is realized at Electric and Electronic Apparatus Department of Moscow Power Engineering Institute (Technical University).

*Key words – low-voltage apparatus, research, universal training test bench.*