

# Abstracts

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

*Baranov M.I.*

### **Lev Davidovich Landau – founder of Kharkov scientific school of theoretical physics and quantum condensed-state physics**

A brief scientific-and-historical essay about creative development and the main scientific achievements in the field of theoretical physics

- 5 made by the outstanding theoretician-physicist of the 20<sup>th</sup> century Lev Davidovich Landau is given.

*Key words* – scientific-and-historical essay, theoretical physics, electrodynamics, quantum physics, nuclear physics, material, achievements, discoveries.

## **Electrical Mashines and Apparatus**

*Vyrovets S.V., Chepelyuk A.A.*

### **Analysis of specific-gap-located ferromagnetic shunt resistors action on pulling forces in an electromagnet with a single-position magnetic catch**

The paper analyzes action of an ferromagnetic shunt resistor on pulling force in an electromagnet with a single-position magnetic catch based on high-coercitivity permanent magnets, the shunt resistor located in the specific gap. Rational dimensions of the ferromagnetic shunt resistor are specified.

*Key words* – electromagnet with a single-position magnetic catch, ferromagnetic shunt resistor, action, analysis.

*Golenkov G.M., Parkhomenko D.I., Makogon S.A., Bondar R.P., Bogaenko M.V., Popkov V.S.*

### **Simulation of operation of a coaxial linear synchronous vibrator with magnet suspension**

Operation of a coaxial linear synchronous vibrator with magnet suspension is simulated. Electromechanical parameters and characteristics of the vibrator are obtained for the control law of  $U/f = const$ . Calculation of the magnetic linkage is performed on the basis of solving the problem of electromagnetic field in the active zone of the vibrator and the magnet suspension.

*Key words* – coaxial linear synchronous vibrator with magnet suspension, operation, simulation.

*Zagirnyak M.V., Branspiz M.Yu.*

### **The basic equations of an e-type electromagnet synthesis problem**

The basic equations for geometric, magnetic and electrical parameters of an E-type electromagnet are obtained. These equations allow solving a problem of the electromagnet synthesis.

*Key words* – electromagnet, geometric dimensions, magnetic circuit, synthesis problem.

*Lupikov V.S., Sereda A.G., Litvinenko V.V.*

### **A high-speed high voltage DC breaker**

The paper describes modernization of a high-speed high voltage DC breaker designed for electric locomotive electrics protection in an emergency operational modes.

*Key words* – high-speed high voltage DC breaker, modernization, emergency operation, electric locomotive electrics protection.

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*Mishyn V.I., Kaplun V.V., Makarevych S.S.*

### **An asynchronous electromechanical complex in an autonomous system**

A generalized computing technique for calculating characteristics of an asynchronous electromechanical complex based on compensated asynchronous machines in an autonomous system is introduced, the technique satisfies any partial situations of joint operation of an asynchronous generator and an asynchronous motor.

*Key words* – asynchronous generator, asynchronous motor, autonomous system, asynchronous electromechanical complex.

*Panchenko V.I., Tsyplenkov D.V., Grebenuk A.N., Kirichenko M.S.*

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### **An asynchronous motor with salient armature projections and hexaphase stator winding**

A scheme of a stator winding with salient armature projections which eliminates deleterious effect of the highest (5th, 7th and other) field density harmonics is considered. The winding has a simple structure and provides a high repair capability of the asynchronous motor.

*Key words* – asynchronous motor, stator, salient armature projections.

*Petrushin V.S., Yakimets A.M., Kalenik B.V.*

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### **Influence of magnetic system saturation and current displacement in the rotor winding on power characteristics of an adjustable-speed induction motor**

Determination of equivalent circuit parameters taking into account magnetic system saturation and current displacement in the rotor winding provides more accurate calculation of power characteristics of an adjustable-speed induction motor.

*Key words* – adjustable-speed induction motor, saturation, current displacement, power characteristics.

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*Radimov I.N., Rimsha V.V., Guliy M.V., Prochina Z.P., Chan Txi Txu Chiong*

### **Development of brushless DC motors with permanent magnets on the basis of a switched reluctance motor stator die**

A feasibility of manufacturing brushless DC motors with permanent magnets on the basis of a switched reluctance motor stator die is considered.

*Key words* – brushless DC motor, switched reluctance motor, magnetic field, electromagnetic torque.

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*Stavinsky A.A.*

#### **Assignment and application features of special electrical machines**

Analysis of specificity is executed, results of development are given, definition is formulated, advantages of application of special electrical machines are shown on an example of piston mechanisms.

*Key words* – **special electrical machine, classification, specificity, operation, application, waterproof compressor.**

*Soskov A.G., Rak N.O., Soskova I.A.*

#### **Analysis of computing methods for semiconductor structure temperature in power semiconductor devices in under their operation in commutation semiconductor apparatus**

Computing methods for calculating semiconductor structure temperature in power semiconductor devices in commutation semiconductor apparatus have been analyzed. An engineering technique for semiconductor structure temperature calculation is introduced. This technique allows calculating unsteady heat conditions of these devices under influence of short-term free-form power impulses.

*Key words* – **semiconductor structure temperature, engineering calculation technique, commutation semiconductor apparatus, unsteady heat condition, short-term power impulses.**

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*Tkachuk V.I., Kasha L.V.*

#### **Ways of electromagnetic moment pulsation reduction in a switched reluctance motor with a buffer of energy**

A construction diagram of an electromechanical transducer and a principle electrical scheme of a transistor commutator of a switched reluctance motor (SRM) with series capacity storage are given. Research results of electromagnetic moment pulsations of the SRM are represented and ways of pulsation level reduction are introduced in this paper.

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*Key words* – **buffer of energy, electrical schemes, switched reluctance motor.**

*Chaban A.*

#### **Application of artificial neural networks for analysis of electromechanical systems**

The paper introduces a neural network based method of artificial intelligence tools application to analysis of steady-state processes in electromechanical devices with distributed parameters. Training of a radial neural network as one of the basic procedures is carried out with mathematical modeling methods.

*Key words* – **electromechanical system, steady-state process, analysis, radial neural network, mathematical modeling.**

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## **Electrical Engineering: Theory**

*Baranov M.I.*

#### **Analytical estimation of a wave electron package periodical structure displacement in a metallic conductor with alternative conduction current**

On the basis of quantum physics and classical electrodynamics principles, an approximate rela-

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tionship for estimation of longitudinal time displacement of de Broglie electron half-waves in a thin metallic conductor with alternative or bipolar pulse conduction current is derived.

*Key words* – **metallic conductor, alternative conduction current, displacement, periodical structure, wave electron package.**

## **High Electrical and Magnetic Field Engineering**

*Bortsov A.V.*

#### **A generator for physical simulation of pulsed electromagnetic fields**

A pulse current generator for physical simulation of pulsed electromagnetic fields has been developed and manufactured. The latest achievements in the field of semiconductor engineering are used in designing the generator, computer simulation of electromagnetic processes in the generator power circuit applied. New pulse forms are obtained, namely, aperiodic pulse, a half-wave of harmonic oscillation, a sheared half-wave of harmonic oscillation. New pulse forms are of great interest in simulation of electromagnetic processes in the plants for magnetic pulse treatment of metals.

*Key words* – **pulse current generator, high-power high-voltage high-speed semiconductor switches, new pulse forms of discharge current.**

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