Abstracts

Electrical Mashines and Apparatus

Baida E.I. **5**

Modeling of short-circuit current interruption by current-limiting circuit breakers

The article considers problems of modeling of short-circuit current interruption by a current-limiting automatic circuit breaker with an electrodynamic unit using a mathematical model developed on the basis of theoretical and experimental research. It allows modeling electric circuit opening, calculating Joule integral taking into account voltaic arc duration, determining the breaker opening time, and significantly decreasing volume of full-scale experiments.

Key words – **short-circuit current interruption, current-limiting automatic circuit breaker, modeling.**

Bolyukh V.F., Bolyukh E.G. **9**

An inductive-dynamic type striking electromechanical converter with an accelerated inductor and an immovable speedup winding

A concept of an inductive-dynamic type striking electromechanical converter with an accelerated inductor and an immovable speedup winding is presented. A mathematical model of the converter describing its electromechanical processes is worked out. Correlations between geometric parameters of the accelerated armature and the immovable speedup winding are determined. It is shown that the introduced electromechanical converter is characterized by increased operating efficiency in comparison with the regular design of the conventional structure.

Key words – **inductive-dynamic type striking electromechanical converter, mathematical model, electromechanical processes, geometric parameters.**

Vyrovets S.V., Chepelyuk A.A. **15**

Design of an electromagnetic system with a single-position magnetic catch on the basis of high-coercitivity permanent magnets for

The paper presents results of FEM computation of an electromagnetic system with a single-position magnetic catch based on high-coercitivity permanent magnets. Operability of the electromagnet is experimentally verified. Reasonable accuracy of the computations testifies to acceptability of the computation model.

Key words – **electromagnetic system with a single-position magnetic catch, high-coercitivity permanent magnets, FEM computation, experimental verification.**

Grishchuk Ju.S., Kuznecov A.I., Grishchuk A.Ju., Rzevskij A.N. **20**

To thermal design of composite-filler fuses

An analytical expression of heat-transfer factor from the external surface of a fuse-element is derived to allow determination of the equivalent heat-transfer factor. Empirical dependence for the fuse-element module resistance adjusted for pinch-in resistance is obtained. A thermal design technique for a quick-break fuse with composite blowout filler is introduced.

Key words – **quick-break composite-filler fuse, heat-transfer factor, thermal design technique.**

Gurevich V.I. **24**

A problem of output relays used in microprocessor-based protective devices: what to do?

It is the author's second publication on nonconformance of parameters of subminiature output relays used in microprocessor-based protective devices to actual operation conditions and standards. The article suggests adjustment of the standards and presents specific engineering solutions to this problem.

Key words – **microprocessor relay, protective relays, switching capacity, inductive load, arc protection.**

Zagirnyak M.V., Usatyuk V.M., Podorozhniy S.V. **30**

Calculation of a new separator design for metallurgical slag processing

A new design of metallurgical slag processing electromagnetic separator on the basis of a cylindrical extracting electromagnet is presented. Its optimum design technique based on 3D field distribution calculation by means of a space integral equation method using Radia® modulus is introduced.

Key words – **electromagnetic separator, 3D field distribution calculation, optimum design.**

Klimenko B.V. **35**

International Electrical Vocabulary – Ukrainian prospects

Publication of selected translation from section 441 - ***Switchgear, controlgear and fuses*** – of International Electrical Dictionary (IED) into Ukrainian finishes. The Ukrainian for the last part of this section, namely, section 441-18 – ***Fuses***, is introduced.

Key words – **International Electrical Dictionary, section 441-18 – Fuses, terms and definitions, translation into Ukrainian.**

Klimenko B.V., Grechko A.M., Eres'ko A.V. **40**

An electromagnetic drive with a two-position magnetic catch for medium-voltage vacuum circuit breakers

Principle of operation and structural features of a patented design of an electromagnetic drive with a two-position magnetic catch for medium-voltage vacuum circuit breakers is considered.

Key words – **medium-voltage vacuum circuit breaker, electromagnetic drive, two-position magnetic catch, principle of operation.**

Korol E.G. **44**

Analysis of methods used at modeling of the hysteretic loop in ferromagnetic materials

Available methods of analytical description of hysteretic loop are considered. Advantages and shortcomings of every method are analyzed. Choice of the method application of which may increase accuracy of the hysteretic loop modeling is substantiated.

Key words – **ferromagnetic materials, hysteretic loop, modeling, analysis.**

Lebedev V.A. **48**

Estimation of energy consumption at mechanized consumable-electrode arc welding

The paper considers a number of questions concerning solving energy-saving problems at mechanized arc welding and deposition. As energy-saving technologies, pulsed processes with specific characteristics are advised to utilize aiming at obtaining controlled transfer of electrode metal. It is shown that at controlled transfer of electrode metal with specific parameters, electricity consumption can be 20…30 % as little as that at conventional processes.

Key words – **electricity consumption, energy-saving technologies, controlled transfer of electrode metal, mechanized arc welding.**

Pavlenko T.P. **52**

Analysis of cathode surface state on the basis of statistical solid-state theory

The paper considers the mechanism of lattice structural components interaction under influence of electric and magnetic fields, temperature, thermodynamic processes that specify vacancies and dislocations creation using the statistical solid-state theory and taking into account new contact material features, namely, thermal emission activity during manufacturing and in actual operating conditions.

Key words – **contact material, lattice structural components, interaction mechanism, statistical solid-state theory, analysis.**

Tereshin V.N., Bogdanova L.E **56**

On operating time of automatic circuit breakers in case of overload currents

Operating time of automatic breakers in case of low overload currents is analyzed under influence of mass brought to the controlling lead of the thermocouple in a thermal bimetallic tripper of elements acting according to a particular mechanism of disconnection.

Key words – **automatic breaker, thermal bimetallic tripping device, thermocouple, overload current, accelerating force, operating time.**

Electrical Engineering: Theory

Baranov M.I. **59**

Heuristic determination of the maximum number of de Broglie electronic half-waves in a metallic conductor with conduction current

An approximate relationship based on atomic and quantum physics laws is introduced to allow calculating possible maximum number of de Broglie electronic half-waves in a thin metallic conductor with direct and alternating (pulse) conduction current.

Key words – **metallic conductor, de Broglie electronic half-waves, conduction current, calculation.**

Zhemerov G.G., Ilina O.V. **63**

Fryze power theory and modern power theories

Principal disadvantages of Fryze power theory that appear in transient operation of a power-supply system are considered in this paper. Modification of Fryze power theory is given to allow regarding it as a particular case of a modern cross-vector power theory.

Key words – **instantaneous active power, instantaneous reactive power, Fryze power theory, cross vector theory.**

High Electrical and Magnetic Field Engineering

Bondarenko A.U., Serikov G.S., Chaplygin E.A. **66**

A low-voltage current pulse generator with a wide frequency range for physical simulation

The circuit schematic and the principle of operation of a developed low-voltage current pulse generator are described. The generator is designed for experimental investigations of inductor systems intended for manufacturing operations at magnetic-impulse material processing within a wide frequency range (1 – 50 kHz).

Key words – **low-voltage current pulse generator, power pack, synchronization module, operating mode, discharge rate frequency, matching transformer, shunt, inductor.**

Kravchenko V.I., Petkov A.A. **70**

Parametrical synthesis of high-voltage pulse test devices with capacitive energy storage

In the work, general principles of parametrical synthesis of high-voltage pulse test devices and their realization are considered at selection of discharge circuits elements parameters with capacitive energy storage.

Key words – **high-voltage pulse test devices, discharge circuit, energy capacitive storage.**