

Abstracts

ELECTROENGINEERING: Prominent events and great names

Baranov M.I.

Retrospective review of research in the field of artificial and atmospheric electricity and lightning protection of technical objects

This is a short scientific-historical essay about initial stage of mankind's study of magnetic and electric phenomena; about Franklin, Rihman and Lomonosov as founders of technical objects' protec-

5 tion from electric charges of atmospheric electricity (lightnings) and outstanding figures of world physical science; as well as about problematic questions of lightning protection of such objects in modern conditions of technosphere development.

Key words – scientific-historical essay, artificial and atmospheric electricity, lightning protection, technical object.

Electrical Mashines and Apparatus

Bolyukh V.F.

Ways of Improvement of Electromechanical Linear Impulse Converters

Ways and directions of increasing efficiency for electromechanical linear impulse converters are analyzed to result from design improvement, liquid-nitrogen cooling, optimal parameter synthesis, optimal active elements configuration and application of multi-stage converters with progressive switching of inductor stages. Classification of these converters about design features is introduced.

Key words – electromechanical linear impulse converters, efficiency, improvement

Galinovski A.M., Lenskaya E.A., Erchard Eichhofer

Research on electric machine valve converters with a limited number of fully-controlled valves

A model of a three-phase/three-phase valve frequency converter is studied under the valves' protective circuit parameters change, the converter based on three diode rectifier bridges that are short-circuited by three fully-controllable switches. It is shown that this converter cannot be used in the excitation system of a noncontact asynchronous machine because of high commutation overvoltage and losses in the converter

Key words – three-phase/three-phase frequency converter, controllable protective circuit parameters change, study.

Grechko M.V., Dyachenko V.V.

On design parameter optimization of automobile inductor generators

The paper considers questions that are necessary to take into account when designing inductor generators for automobile transport.

Key words – inductor generators, designing, parameter optimization, automobile transport.

Gul V.I., Nigevisky V.I., Nigevisky I.V.

Electric descriptions of two-tier equipotential grounder made from single horizontal electrodes

Results of research into further development of calculation methods for electric characteristics of grounding devices are given. It is shown that these characteristics are obtained for homogeneous and heterogeneous structure of soil. A generalized mathematical definition for resistance to spreading

14 and potential at any point of soil half-space is introduced. Calculation formulas for electric characteristics of a two-tier equipotential grounder are obtained.

Key words – calculation method, electric characteristics, two-tier equipotential grounder

Kapinos V.M., Navrotsky V.V., Smorodskaya I.V. 36
Thermal calculation of a tape-type electrical air heater

Thermal calculation of an electrical heater with a steel tape inside a rectangular channel and symmetrical air flow is presented.

Key words – thermal calculation, electrical air heater, steel tape.

22 *Pavlenko T.P.* 39

Charged particle displacement mechanism in the crystal lattice of a contact composite

The paper considers physical processes in a crystal lattice that affect charged particle displacement mechanism and contact material composites properties. The considered mechanism reveals reasons for atom shocks and their displacement within a lattice vacancy and internodes and specifies action of diffusion and self-diffusion.

Key words – charged particle displacement mechanism, crystal lattice, contact material composites.

30 *Cebko V.V.* 42
About influence of dominating impurity on electromagnetic parameters of a cylindrical product

Influence of a dominating impurity of carbon in steel A-20 on values of magnetic permeability m_r and specific electric conductivity s of the cylindrical product made of steel A-20 is considered. It is shown that increase from 0,1 % up to 5,5 % of carbon leads to reduction of m_r and s approximately by 40 % and 31 %, accordingly.

Key words – magnetic permeability, impurity, specific electric conductivity, converter

33 *Sebko V.P., Filonenko D V., Nozdrachova K.L.* 44
Calculation of expected values of signal components of a three-parameter electromagnetic converter

Calculation of a two-frequency contact electromagnetic converter is made on the basis of derivative extremum of normalized internal induc-

tance of a rectilinear core. An algorithm of joint determination of two values of resistance and inductance corresponding to frequencies of magnetic current change at the extremum and at any other frequency is introduced.

Key words – magnetic current, frequency, electromagnetic converter, resistance, inductance.

Fomin V.I.

Influence of number of sequential isthmuses on protective characteristics of fast fuses

The paper analyzes influence of number of sequential isthmuses of a silver fuse element on protective characteristics of fast fuses.

Key words – fast fuse, isthmus number, protective characteristics

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Electrical Engineering: Theory

Baranov M.I.

Electrodynamical development of Bohr's quantum atom theory

Results of theoretical investigations of micro-electromechanical processes inside the simplest atom of the matter – the hydrogen atom - are presented from the point of view of classical and quantum electrodynamics on the basis of Bohr's atom theory. The results allow a new view on electrophysical mechanism of in-atom quantum effects in the matter.

Key words – matter, hydrogen atom, Bohr's theory, microelectromechanical processes, quantum effects.

Batygin Yu. V., Chaplygin E. A.

Vortical currents in flat mettalic sheet

A theoretical analysis of electrodynamic processes in single-turn inductor systems for magnetic pulse working of sheet metals with real specific conductivity is fulfilled. Reliability of obtained results is verified by means of limit transmissions. The main result reveals the fact that phase bias between an induced signal and inductor current is in the range $\Delta\varphi \in [0.5\pi, \pi]$.

Key words – electrodynamic processes, inductor system, sheet metals.

Kravchenko V.I., Yakovenko I.V., Glyhoff E.V.

Energy losses in a charged particle flux due to electromagnetic oscillation excitation in semiconductor structures

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Electromagnetic oscillation energy in a system of semiconducting plasma – charged particle flux is determined under the oscillation excitation in a submillimeter range. An analytical model of interaction mechanism for the electromagnetic oscillation and currents arising due to action of electromagnetic radiation in current – conducting elements of electric radio apparatus containing semiconductive super lattices is presented.

Key words - electromagnetic oscillation energy, semiconducting plasma – charged particle flux system, interaction mechanism, analytical model, electric radio apparatus.

Kravchenko V.I., Yakovenko I.V., Losev F.V.

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Instability of surface waves at their interaction with a charged particle flux in semiconductor structure

The paper presents an analytical model of an interaction mechanism for currents arising due to action of electromagnetic radiation in current – conducting elements of electric radio apparatus with inner electromagnetic oscillations of metal – dielectric – semiconductor structures. An instability increment that results from this interaction and specifies oscillation excitation in a submillimeter range is determined.

Key words - conducting elements, electromagnetic radiation, currents, interaction model, instability increment, electric radio apparatus.

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Electric stations

Orlovsky I.V.

Ways of control perfection in Kharkov CHPP-5 concerning electric energy expenses reduction in its of water chemical preparation shop

Ways of control system perfection in Kharkov Combined Heat&Power Plant-5 for reduction of electric energy expenses are introduced for the

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plant's water chemical preparation shop. They are based on prediction of week electricity consumption by the shop and diminishment of its sensors questioning period to week.

Key words – combined heat&power plant, energy expenses, consumption predicytion, control system.

Electric Transport

Khvorost M.V.

Propulsion asynchronous transmission of a high-efficiency underground carriage

The paper presents a propulsion asynchronous transmission structure for a 1000 kW underground carriage that allows implementing a combined propulsion system for five-carriage underground trains for feeding voltage of 1500 V with the following scheme: two head motorized carriages with driving compartments at the head and at the tail of

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the train with three other carriages between. It is shown that efficiency of the propulsion asynchronous transmission scheme introduced exceeds 0.92 at inversion pulse- width modulation frequency of 3 kHz even with utilization of current limiting units under voltage inversion failure.

Key words – propulsion asynchronous transmission, five-carriage underground train, efficiency.