

Abstracts

ELECTROENGINEERING: Prominent events and great names

Baranov M.I.

Ervin Schrödinger and new ways of development of microcosm physics.

A short scientific-historical essay about the founder of wave mechanics Schrödinger, the main

5 physical ideas of this science and its significance for modern scientific knowledge is given.

Key words – **founder, wave mechanics, physical ideas, physics, microcosm.**

Electrical Mashines and Apparatus

Burkovsky A.N., Rybalko O.A.

Methodical questions of determination of windings heating in power induction motors with short-circuited rotor in starting conditions.

The paper presents a technique for calculation winding heating in high-power induction motors in starting conditions that includes calculation of terminal voltage in motor startup and its torque characteristic under real voltage, starting winding losses and their distribution over windings' thermal equivalent circuit elements. A calculation example is given.

Key words – **induction motor, winding, heating, calculation.**

Klimenko B.V., Grechko A.M., Vyrovets S.V., Bugaychuk V.M.

A fast electromagnetic drive for an average-voltage vacuum switch with ousting of magnetic field.

A pilot model of a fast-acting electromagnetic drive with ousting of magnetic field for a vacuum switch is considered. Principle of operation of the introduced electromagnetic drive design is described. A microprocessor control system with a computerized workbench that allows obtaining dynamic characteristics of the electromagnetic drive is created.

Key words – **vacuum switch, electromagnetic drive, dynamic characteristics.**

Pavlenko T.P.

Component diffusion in new composite electric contact materials.

The paper shows diffusion mechanism for components of electric contact composites with different properties. The diffusion results in redistribution of the grains of contact composite material, which causes the structure compaction as well as temperature rise and arc resistance increase of the composite. The composite acquires special thermoemission properties that result in decreasing working surface erosion.

Key words – **electric contact composite materials, components diffusion, thermoemission properties.**

Rymar S.V.

Optimization of a three-phase transformer with enlarged transversal leakage fluxes.

An optimization model of a three-phase transformer with enlarged transversal leakage fluxes passing from one transformer core rod to another is

16 developed. The model allows calculating weight-, volume- and cost-optimal transformers with both movable and static windings under control of given leakage inductance.

Key words – **three-phase transformer, optimization, transversal leakage flux, leakage inductance, parameters, welding engineering, converter engineering.**

Khonkulov U.Kh.

Mathematical models for steady parallel run of synchronous motors in large pump stations.

The paper presents mathematical models for steady-state modes of parallel operation of synchronous motors subject to the motors interference. The models allow specifying operation mode attributes for such motors, especially for the case of the mains power commensurable with the synchronous motor power.

Key words – **synchronous motors, steady parallel run, mathematical model, operation mode attributes specification.**

Chaban A.

Mathematical simulation of electromechanical oscillatory processes in a steam turbine-turbogenerator system.

The paper introduces a calculation technique for torsional oscillations in an electromechanical system, using a steam turbine – turbogenerator system as an example. The turbogenerator is described with a circuit-field mathematical model, the drive-shaft is described with a distributed-parameter model. Discrete differential equations of the system are given in normal Cauchy form. Results of the computation are used to analyze strength of the drive-shaft in the turbine-generator rotor system.

Key words – **steam turbine – turbogenerator system, torsional oscillations, mathematical simulation, discrete differential equations, Cauchy's form.**

Shynkarenko V.F., Avgustynovych A.A., Nestyaylo O.S.

Intragroup structure genetic modeling of electromechanical energy converters.

Intragroup structure genetic modeling of electromechanical energy converters is considered. A genome structure and population structure of Linear Motion Cylindrical Electric Machines species have been synthesized as an example. Adequacy

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estimation of species synthesis genetic models is made. Possible practical applications of results obtained are shown.

Key words – cylindrical electric machine, linear motion, genetic analysis, genome structure, population structure, species synthesis.

Electrical Engineering: Theory

Lupikov V.S., Krjukova N.V., Geljarovskaja O.A., Korol E.G., Varshamova I.S., Gil L.A., Derkach V.V.

Analysis of magnetic moment produced by currents of a three-phase field source.

A simulation technique for magnetic moment of currents in three-phase electrical equipment is introduced. Analytical relationships are obtained to compute instantaneous values of magnetic moment vector and its components produced by a three-phase field source that simulates electrical equipment. Results of the source magnetic moment simulations are given for different current forms.

Key words – electrical equipment, magnetic field, magnetic moment, simulation.

Pilyugina O.Yu., Pelevin D.E., Erisov A.V.

Design simplification of high-precision static apparatus for magnetic moment determination.

The paper considers questions of simplification of high-precision static apparatus design intended for determination of magnetic moment of

technical objects, the simplification maintains good figures of the apparatus truncation error.

Key words – high-precision static apparatus, magnetic moment determination, design simplification.

Rozov V.Ju., Piljugina O.Ju., Dobrodeev P.N., Getman F.V., Volohov S.A., Lupikov V.S.

Introduction to demagnetization of technical objects.

Methods of purposive action on magnetic fields of technical objects and products are analyzed, the methods applied to meet requirements when solving various engineering problems, such as electromagnetic compatibility of technical means, magnetic protection of ships, magnetic ecology and sanitation, protection of technological processes from harmful effect of magnetism.

Key words – technical means, magnetic field, electromagnetic compatibility, purposive action, analysis.

High Electrical and Magnetic Field Engineering

Baranov M.I., Bocharov V.A., Zybko Yu.P.

Complex high-voltage electrophysical equipment for testing lightning protection of technical objects via storm and switching micro- and millisecond voltage impulses with up to 1 MV amplitude.

The paper describes a high-voltage electrophysical test system that generates aperiodic standard and nonstandard storm and switching voltage impulses of micro- and milliseconds duration with amplitude of up to 1MV and is intended for testing passive and active lightning diverters (lightning rods) and other lightning protection facilities protecting technical objects from direct action of storm electric spark discharges (lightning).

Key words – high-voltage electrophysical equipment, storm and switching voltage pulses, lightning protection, technical object.

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

Generation of electromagnetic oscillations in semiconductor structures by charged particle flux.

A theory of interaction of charged flux with plasmons existing in two-dimensional (2D) electron gas is developed. It is supposed that electrons in the flux that passes through a localization region of 2D gas represent a wave packet, energy band of which is small as compared with plasmon energy. An equation characterizing plasmon field change is obtained, and instability increment is found.

Key words – electromagnetic oscillations, charged particle flux, plasmons, instability.

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

Interaction of EMF-induced charged particle flux with electromagnetic oscillations in semiconductor accessories of radio equipment.

Action of pulsed electromagnetic radiation on electric radio apparatus often results in EMF and currents arising in inner conductive elements as well as distortion of their internal fields. Power losses of charged particle flux caused by such interaction due to excitation of surface polaritons in metal – dielectric – semiconductor structures have been determined.

Key words – electromagnetic radiation, surface polaritons, charged particle flux.

Rudakov V.V., Pokladov O.V., Kravchenko Yu.V.

Electric field computation for flat tips with solid dielectric.

In the article, an electric field computation problem for a system of two flat tips is considered as applied to a Fitch current-impulse generator, with utilization of Fredgolm's integral first- and second-order equations. Dependences of relative electric field strength from tip-corner radius - general insulation thickness relation are obtained. Recommendations as for tip-corner radius choice and insulation laying procedure are given.

Key words – flat tips, electric field, Fitch current-impulse generator, Fredgolm's integral first- and second-order equations, computation.