Abstracts

ELECTROENGEENIRING: Prominent events and great names

Baranov M.I.

Nikola Tesla and modern electrical engineering

A brief sketch about Tesla's remarkable achievements in the field of electrical engineering

5

and about his significant role in scientific and technological advance of the humanity is given.

Key words - **history, electrical engineering, scientific and technological advance, humanity.**

Electrical Mashines and Apparatus

Golenkov G.M., Bogaenko M.V., Bondar R.P., Makogon S.A., Popkov V.S.

Mathematical simulation of a linear induction motor operation as a vibration exciter

Problems resulting from application of various-type windings for linear induction motor vibrators are investigated. A mathematical model for calculation of magnetizing forces generated by the motors with various winding types is developed, recommendations to their application are given.

Key words – **vibration exciter, linear induction motor, magnetizing force.**

12

Zheleznyakov A. V., Chuvashev V. A.

Mathematical simulation and numerical analysis of electromagnetic fields and transients in submersible induction motors with a cast copper squirrel-cage rotor winding.

Mathematical models for numerical investigations of electromagnetic fields in the active zone of a submersible induction motor (SIM) are developed in the form of algorithms and computer programs. Mutual and leakage field distribution inside the motor and influence of the rotor eccentricity on magnetic attraction are studied. Recommendations for improving the SIM are elaborated.

Key words – **submersible induction motor, electromagnetic field, mathematical model, eccentricity, numerical investigation**

15

Ivanov V.A., Grivin S.A., Chuvashev V.A., Chuvankov V.Yu.

Influence of a copper squirrel-cage rotor casting technology on induction motor iron losses.

Influence of a copper squirrel-cage rotor casting technology on magnetic properties of electric steel in explosion-proof induction motors of up to 400 kW has been proved experimentally. Significant decrease in rotor core steel losses (and increase in motor efficiency by 1.2…1.8 %) is expected for traction induction motors of 400 kW to 1200 kW used in new transportation facilities fed from 46-150 Hz frequency converters.

Key words - **copper squirrel-cage rotor casting, influence, steel losses, explosion-proof induction motor.**

22

Kanov L.N.

Parameter synthesis of speed-torque characteristics of an asynchronous motor on the basis of a circuit simulation method

An effective numerical technique for parameter synthesis of speed-torque characteristics of an asynchronous motor is introduced, the technique based on a circuit simulation method and intended for automated choice of additional resistances in the motor circuits over the criterion of desired and actual characteristics proximity.

Key words – **electric drive, circuit simulation, criterion of optimality, gradient, speed-torque characteristic.**

32

Klementiev A.V.

On some features of noncontact combined synchronous generators with an alternating rotor winding structure

In the article, some features of design and physical processes in a noncontact synchronous machine with an alternating rotor winding structure are examined.

Key words – **noncontact combined synchronous machine, excitation winding, rotor winding, alternating structure, switching.**

30

Konohov N.N.

Peculiarities of electric intensity concentration in the windings of electrical machines and its influence on reliability

Mechanisms of electric aging and electric intensity concentration (EIC) in the frame insulation of electrical machines (EMs) are revealed and generalized. EIC action and EM fixed windings features influence on reliability of the winding insulation are shown. Well-known (classical) methods and a new simple and technologic way of local voltage surge reduction in insulation of average- and large-scale EMs, developed by the author, are considered.

Key words – **electric intensity concentration, electrical machine, winding insulation, reliability.**

32

Malyar V.S., Malyar A.V. **37**

A calculation technique for transient processes in asynchronous motors of high-inertia electric drives

A calculation technique for transient processes in asynchronous motors which work with mechanisms with a large moment of inertia is proposed. The technique allows obtaining time dependences of mode coordinates, with saturation and current displacement in rotor keyed-bars taken into account, on the basis of numerical integration of an electric drive motion equation using a set of coordinates for pre-calculated steady-state modes that correspond to different slip values.

Key words – **asynchronous motor, moment of inertia, transient processes.**

Milykh V.I., Polyakova N.V. **40**

Determination of electromagnetic parameters of electric machines based on numerical calculations of magnetic field

A trend of electric machine design and research improvement, namely, direct application of numerical calculations of magnetic field, is described. General formulation of such calculations and examples are given. Resulting from vector magnetic potential distributions obtained, basic expressions for electric machine electromagnetic parameters, such as magnetic induction, magniflux, flux linkage and permeance, magnetic potential drop, EMF, self- inductance and coefficient of mutual inductance, force, moment, energy, are derived.

Key words – **electric machine, magnetic field, numerical calculation, electromagnetic parameters, design**

Parfenovich O.N., Tretiacov A. C. **47**

Elements of a theory of thermal and ventilation processes in an electric motor with DAS–type circuit layout.

Foundations of a theory of thermal and ventilation processes in electric motors with a DAS circuit layout are introduced. Thermal equivalent circuits and thermal processes calculation on their basis are considered, generalized equivalent circuits of the motors employed for ventilation characteristics calculation. Also, experimental data for ventilation and thermal calculations are given.

Key words - **electric motor, theory of thermal and ventilation processes, DAS circuit layout.**

Petrenko A.N., Petrenko N.Ya. **53**

Designing peculiarities for an inductor-type tractor generator with combined excitation.

Performance characteristics improvement for electric equipment of motor vehicles and agricultural machinery is an urgent problem. The paper considers problems of a permanent-motor generator rotor designing. The generator's magnetoelectric system operation is analysed via an equivalent circuit of the magnet external circuit taking into account magnetic state of the magnet itself. To calculate an external characteristic, the permanent magnet operating diagram is used.

Key words - **inductor-type generator, permanent magnet, equivalent circuit, designing.**

Rimsha V.V., Radimov I.N., Chan Txi Txu Chiong. **56**

Influence of stator tooth zone configuration on electromagnetic torque and radial electromagnetic forces in a switched reluctance motor.

Results of comparative analysis of electromagnetic torque and radial electromagnetic forces for a four-phase switched reluctance motor (SRM) with the number of poles equal to 16/12 for various stator tooth zone configurations are presented. It is shown that selection of the stator tooth shape is a multicriterion problem that must be solved with an allowance for specific character of electrical SRM drive load.

Key words – **switched reluctance motor, electromagnetic torque, electromagnetic forces, eccentric rotor position.**

Fedorov M.M., Tkachenko A.A. **59**

On the problem of fault monitoring system designing for induction motors

The paper presents analysis of induction motor failures. Causes of fault initiation and fault behavior are studied. Available approaches to fault monitoring system designing are analyzed. A current-state monitoring system structure for induction motors is introduced.

Key words – **fault monitoring system, induction motor, current-state monitoring, design.**

Tchaban A.V. **62**

Mathematical simulation of electromechanical oscillation processes in a multimass system with an induction motor

The paper introduces an electromechanical oscillation process analysis method for a multimass system with a deep-bar induction motor drive. Processes are described in phase coordinates. Differential equations of the electromechanical system are given in a normal Cauchy form. Results of computations have been used for analysis of the motor angular rate and elastic torques in drive shafting coupling joints of the electric drive.

Key word - **deep-bar induction motor, multimass system, electromechanical oscillation processes.**

Electrical Engineering: Theory

Baranov M.I. **66**

A simplified mathematical model of microprocesses in a conductor with a conduction current.

On the basis of a simplified mathematical model developed in accordance with classical physics principles for microprocesses in a metallic conductor with an electric current of an arbitrary time curve, an estimation of the most important physical magnitudes specifying free electron drift in the conductor material under external electric field action is given.

Key words – **mathematical model, calculation, microprocess, conductor, electric field, electric current.**

Polovinka D.V., Nevzlin B.I., Zagirnyak M.V. **71**

Analytic dependences of output voltage for a diode-capacitance bridge under conductance components extraction

Equivalent circuits of diode-capacitance bridges used for extraction of active and reactive conductance components in an instrument transducer with a wet discrete material are introduced. Analytic dependences of the bridge output voltage upon the transducer parameters are obtained, which allows determining desired moisture of the discrete material.

Key words - **equivalent circuit, diode-capacitance bridge, analytic voltage dependence, instrument transducer, discrete material.**

High Electrical and Magnetic Field Engineering

Kravchenko V.I., Nemchenko Y.S. **76**

Basic reference standard of Ukraine for pulsed electric and magnetic fields –purpose of the standard creation, standard requirements and its embodiment

The article describes the purpose and results of creating a Basic Reference Standard of Ukraine for units of pulsed electric and magnetic field intensities intended for measurement assurance of uninterrupted work of the Experimental Base NIPKI "Molniya", a national property of Ukraine. This Standard is exclusive in Ukraine. Brief requirements as for metrological, structural and field-performance data of the created Standard and ideology of the Standard creation and its structure are given in the article.

Key words – **pulsed electromagnetic field, standard, strip line.**