

Abstracts

Electrical Mashines and Apparatus

Belyi P.N., Opryshko V.V.

A slow-speed low-power disc-type magnetoelectric motor

A disc-type magnetoelectric micromotor is considered. The motor magnetic system arrangement is given. Estimation of magnetic field and electromagnetic moment of the motor is made.

Key words – magnetoelectric motor, high-coercivity permanent magnet, magnetic system, disk-type, slow speed.

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

Switching overvoltage of a rotary converter of a noncontact synchronous machine in asynchronous operation mode

Action of the field coil EMF of a noncontact synchronous machine in asynchronous operation mode on overvoltage magnitude of a three-phase rotary bridge converter with the gate protection from internal overvoltage has been studied. It is shown that for the field coil EMF amplitude exceeding the converter no-load voltage, voltage on the diode converter gate reaches the field coil EMF amplitude, and the field coil voltage reaches the sum of the field coil EMF and power source amplitudes, external overvoltage eliminated in reversible thyristor converter with a hybrid control law.

Key words – noncontact synchronous machine, rotary bridge converter, switching overvoltage, asynchronous operation.

Golenkov G.M., Bondar R.P.

Mathematical simulation of tubular linear synchronous vibrator operation in a trenchless pipelayer

Problems of linear synchronous vibrators application to pipe driving are considered. Design of a tubular linear synchronous vibrator with permanent magnets is introduced, a mathematical model of a vibropercussion system motion developed. Research into influence of power pulse shape on the system mechanical parameters is done.

Key words – trenchless technology, linear synchronous motor, vibropercussion system.

Pavlenko T.P.

On activated particles migration in contact composition element lattices

The paper considers activated state of a statistic thermodynamic system in configuration phase space. Analysis of the given research results allows developing a calculation technique to explain causes of possible motion of arc reference points on the contact face.

Key-words – system activated state, particle migration, configuration phase space, arc reference point motion.

Rymsha V.V., Radimov I.N., Barantsev M.V.

An ANSYS Workbench 10.0 based calculation technique for stationary 3D magnetic field

5 in switched reluctance motors

The main steps of stationary 3D magnetic field calculation for switched reluctance motors via ANSYS Workbench are described.

Key words – switched reluctance motor, magnetic field calculation, electromagnetic torque, flux linkage.

Sebko V.V.

Determination of electromagnetic parameters of a pipe adjusted for the pipe temperature

9 The paper considers a temperature coefficient α calculation technique with application of a new multiparameter method of relative magnetic permeability μ_r , electric conductivity σ and temperature t determination for a pipe in the temperature range of $20^\circ\text{C} \leq t \leq 180^\circ\text{C}$ and within the μ_r range from 50 through 1000. The basic relationships for the electromagnetic parameters of ferromagnetic pipes are derived along with expression for the temperature at which the parameters are determined.

Key words – electromagnetic parameters, calculation technique, ferromagnetic pipes.

Sebko V.P., Bezzaponnaya V.M.

Calibration of a device for flat weak-magnetic samples monitoring

16 A calibration technique for a low-magnetic sheet materials monitoring device is considered. A way of proper calibration of the device in low and medium magnetic fields is shown. Circuits for AC and DC calibration are used.

Key words – low-magnetic sheet materials, monitoring device, calibration technique.

Tereshin V.N., Bogdanova L.E.

Methodological principles of thermal-bimetallic actuating mechanism designing for electromechanical protectors

41 Principles of thermal bimetallic mechanisms designing for protection and control devices are introduced to allow choice of the thermal element shape and the thermal bimetal grade from which the thermal element will be made. Optimal geometrical parameters of the element and heating techniques are also given.

Key words – electromechanical protector, actuating mechanism, thermal element, thermal bimetal, designing.

Chuvashov V.A., Papazov Yu.N., Chuvankov V.Yu., Parshikov A.M., Velikov A.A.

Energy-efficient induction motors for Ukrainian coal industry

25 Recent achievements in Ukraine, the USA, France, Italy, Germany, Poland, Brazil and India associated with creation of induction motors equipped with a copper cast rotor winding are analyzed. Bench test results show that the above motors are characterized with higher efficiency and greater useful power as against similar motors

equipped with aluminum rotors.

Key words – induction motors, copper cast rotor winding, higher efficiency.

Sharaban Yu.V.

Elaboration of an iron-cobalt magnetic core technology for aviation motor stators

A technology of aviation motor stator magnetic core manufacture from alloys with a high saturation induction is described.

54 Key words – iron-cobalt alloy, annealing, magnetic core, mandrel, gluing, thermomagnetic processing.

Electrical Engineering: Theory

Degtyarev A.V.

A twelve-point method and a three-module measuring system for space harmonic analysis of magnetic field

A twelve-point method and a three-module system for magnetic moment measurement in technical objects are introduced. An algorithm for eliminating action of the most powerful multipole disturbances of magnetic field space harmonics on measurement results is worked out. Mathematical

57 models for a measured signal and for a multiple component of the method error are developed. High accuracy of the magnetic moment measurement system, as compared with a two-module measuring system, is achieved.

Key words – magnetic field, magnetic moment, twelve-point method, measuring system, space harmonic, multipole disturbances, measurement accuracy.

High Electrical and Magnetic Field Engineering

Baranov M.I.

Approximate calculation of ultrahigh electric and high magnetic fields in a material atom

Results of evaluation calculations of ultrahigh electric and high magnetic fields in the simplest material atom, a hydrogen atom, are given, the calculation based on Bohr's quantum-mechanical model of the atom improved by the author. It is shown that in the material atom studied electric field strength E_{en} is up to 10^{16} V/m and magnetic field strength $H_{en} - 10^7$ A/m. Estimated density of electric field energy w_{En} in the hydrogen atom is about 10^{21} J/m³ and that of magnetic field energy w_{Hn} is about 10^7 J/m³.

Key words – hydrogen atom, ultrahigh electric field, high magnetic field, strength and density of electric field energy, strength and density of magnetic field energy.

Batygin Yu.V., Golovashchenko S., Serikov G.S.

Magnetic field and pressure excited by a single-turn inductor in a sheet-billet bend

Electrodynamic processes in an inductor system intended for bend molding on prebent metal plates are theoretically analyzed. Analytical expressions for magnetic field strength are derived. Their validity is verified by means of limiting process to known and earlier-described solutions. Calculations made for the inductor system reveal feasible variants of the system design which allow higher efficiency by increasing force action efficiency in the bend molding zone and decreasing

60 pressure on the adjacent surface of the sheet billet.
Key words – magnetic pulse metal working, inductor system, bend molding, sheet billet.

Chaplygin E.A.

Magnetic field in a thin-wall sheet billet at low values of operating frequencies

Characteristic of magnetic field excited in the metal of a thin-wall sheet billet in an inductor system at low values of operating frequencies of a current impulse is calculated. It is revealed that a high-power normal component of the magnetic field strength, distribution of which is not limited by the width of the induction coil, is excited.

Key words – thin-wall sheet billet, field characteristic, low operating frequencies, high-power normal component.

Yuferov V.B., Shariy S.V., Druj O.S., Serosh-tanov V.A., Ilichova V.O.

A simulation cryogenic solenoid of an experimental plasma magnetic separator

66 A large-size cryosolenoid with a non-vacuum cryostat has been designed, estimated and made in laboratory conditions. Experimentally obtained characteristics of the solenoid and its thermophysical parameters are in good agreement with calculated data and show areas of possible application of the solenoid for experimentation on electromagnetic separator of elements.

Key words – cryosolenoid, non-vacuum cryostat, thermophysical parameters, electromagnetic separator.

Electric Transport

Chvorost M.V., Bozhko V.V.

An underground traction power supply system of higher efficiency

The paper analyzes circuit solutions for the main blocks of an underground traction power supply system with a longitudinal high-voltage DC

79 supply line. It is shown that their application may significantly improve technical perfection figures of the underground traction power supply system.

Key words – traction power supply system, longitudinal high-voltage supply line, circuit solutions.