Abstracts

ELECTROENGEENIRING: Prominent events and great names

Baranov M.I. **5**

Radio electronics: short history of its formation as the thematic applied-physics field of both electricity and scientific-and-technological advance of the humanity.

The paper presents a brief review of the basic achievements of the humanity in the field of generation, transmission, reception and amplification of high-frequency electromagnetic vibrations in micrometer–meter ranges of wavelengths related to such an advanced branch of science and technology as radio electronics.

Key words – **radio electronics, high-frequency electromagnetic vibrations, radio wave, generation, transmission, reception, amplification.**

Electrical Mashines and Apparatus

Hawryljuk R. **13**

Charts of symmetric three-phase two-layer windings with switching of the number of ports in the ratio of 1 to 2 (number of slots z = 48).

All variants of symmetric three-phase two-layer windings charts in asynchronous electric motors that are feasible with the relation of the number of ports of 1:2 and the number of slots z = 48 are described. 112 different charts are found, each of them better than others according to at least one of 12 criteria.

Key words – **two-speed (1:2) charts of windings, electric machines, number of slots 48.**

Gaponenko G., Kobozev A., Omelchenko V. **19**

Rise in reliability of 0.4-kv mains protection by circuit breakers with microprocessor-based trip units owing to increase in protection amount, rise of sensitivity to remote short circuits and realization of remote power system redundancy mode.

A possibility of sufficient increase in protection reliability for air and cable electric 0.4-kV mains through replacement of analog electronic trip units by microprocessor-based ones in circuit breakers is studied. The microprocessor-based electronic trip units provide greater amount and higher quality of protection. Extensive research and analysis of processes in electric lines resulted in significantly increasing sensitivity of protection to remote short circuit currents and a probability of a no-failure protection through implementation of remote power system redundancy mode.

Key words – **reliability, protection, circuit breaker, sensitivity, remote short circuit, redundancy.**

Kanov L.N. **24**

Determination of phase voltage distortions in a synchronous generator under pulse excitation by means of circuital modeling.

A circuital-modeling-based calculation technique for a phase voltage unsinusoidality factor in a synchronous pulse-excited generator is introduced. An example of phase voltage distortion analysis under the generator excitation by square-wave pulses is given. A possibility of wavelet analysis application to phase voltage shape studies is shown.

Keywords – **synchronous generator, phase voltage distortion, circuital model, pulse excitation, wavelet analysis.**

Klimenko B.V., Kokhanovskiy V.O. **28**

Features of electrical erosion of relay contacts made of silver with oxide additions.

Results of research on electrical erosion of contacts in dc chains as function of current strength and number of commutations are presented. Influence of composition material ingredients on mass transfer behavior is specified, inversion zones of the electrical erosion revealed.

Key words – **electrical erosion, electrical contacts, composition material.**

Knyazyev V.V., Safnyuk G.Y. **30**

Estimation of certification result uncertainty for a surge generator.

The structure of a setting is briefly considered, a chart of a generator certification is given. A model measurement equation which is a necessary condition of budgeting uncertainties is presented. A certification result uncertainty estimation technique is realized.

Key words – **generator, certification, electromagnetic compatibility, uncertainty.**

Kuznetsov B. I., Vasilets T.E., Varfolomeev A.A. **34**

Nonlinear dynamic object neuro-control using a generalized predictive control method.

In the given paper, utilizing a predictive neuro-controller for providing high performance characteristics of a nonlinear dynamic object control system is proposed. For the controller design, efficient implementation of generalized predictive control is applied by utilizing a multi-layer feed-forward neural network as a nonlinear model of the control object. A chart of the control system is developed, the controller synthesis and the system modeling made.

Key words – **predictive neuro-controller, neuro-system, multilayer feedforward neural network.**

Nevzlin B.I., Zagirnyak M.V., Zagirnyak V.E. **42**

Refinement of medium-power induction motors efficiency value.

Dependence of efficiency on slip has been refined for medium-power induction motors.

Key words – **induction motor, efficiency coefficient, equivalent circuit.**

Nizhevskiy I.V., .Nizhevskiy V.I. **44**

Electric descriptions of two-level equipotential grounding device made from single circular electrodes.

An analytical estimation method is introduced

for electric parameters of a two-level structure of a grounding device made from circular electrodes. The novelty of the method consists in allowance for arbitrary location of two circular grounding devices in the ground with respect to each other. Results obtained allow correct choice of geometrical sizes of a two-level grounding device made from circular electrodes for desired initial conditions at planning or modernization of such grounding devices with the purpose of providing standard requirements.

Key words – **calculation method, electric descriptions, two-level equipotential grounding device.**

Soskov A.G., Rak N.O. **48**

Analysis of current distribution between the main contacts and a shunt circuit with a semiconductor switch under current interruption by a hybrid contactor.

Analysis of current transition from the main contact circuit to a shunt circuit with a semiconductor switch has been performed. The analysis has been made with allowance for the influence that voltage drop both on a liquid metallic bridge and on the "short" arc has on this process. A physical model explaining an accidental process of frequent current transition from the main contact circuit to the shunt circuit under interruption of the circuit has been introduced.

Key words – **semiconductor switch, shunt circuit, current transition, metal walkway.**

Tereshin V.N., Bogdanova L.E. **53**

About one direction of stability increase of automatic switch overload current setting.

Influence of automatic switch calibration current values on overload current setting stability is investigated. A current-free calibration method that allows increasing stability of the overload current setting is developed.

Key words – **overload current setting stability, current-free calibration method, automatic switch.**

Shayda V.P., Dubinina O.N. **57**

Regression analysis of a DC motor no-load characteristic.

Polynomial theoretical dependence of a DC motor no-load characteristic is obtained and estimated with statistical methods.

Key words – **direct current motor, no-load characteristic, regression analysis.**

Electrical Engineering: Theory

Baranov M.I. **60**

Physical limitation of applicability of a weakly-dispersed free electron model to a metallic conductor with a conduction current.

The paper presents computational results concerning estimation of the condition that limits application of a model of drift free electrons weakly dispersed by lattice ions to a round thin cylindrical metallic conductor with an axial conduction current of different amplitude-time parameters.

Key words – **metallic conductor, conduction current, de Broglie half-waves, lattice ions, dispersion of free electrons.**

High Electrical and Magnetic Field Engineering

Batygin Yu. V., Vorobyov D.O. **63**

Magnetic field of a single-turn inductor with a conical internal hole.

A theoretical analysis of magnetic-field excitation processes in a conical internal hole of a single-turn inductor is conducted. Simple formulas for the magnetic-field vector components are obtained. The obtained formulas are shown to satisfy exact solutions of Maxwell equations and boundary conditions of the electrodynamic problem.

Key words – **magnetic field, conical internal hole, single-turn inductor** electrodynamical**.**

Zolotaryov V.V., Karpushenko V.P., Zolotaryov V.M., Naumenko A.A. **65**

Distribution of stationary electrical field in a cylindrical non-ideal dielectric material.

An analytical method of harmonic electrical field strength calculation for a set of cylindrical electrodes between which a multi-layer piecewise homogenous non-ideal dielectric material is placed is proposed.

Key words – **electrical field strength distribution, cylindrical electrodes, harmonic electrical field, non-ideal dielectric material.**

Kravchenko V.I., Kniazev V.V., Lesnoi I.P., Nemchenko Yu.S., Guirka Yu.N. **70**

Experimental research on output charachteristics of standard of electromagnetic field.

A "Basic reference standard for maximum intensity units of pulse electric, volt per metre (V/m), and magnetic, ampere per metre (A/m), fields" is worked out and constructed with a nanosecond intensity rise time for an electromagnetic field with the magnitude reaching hundreds of kV/m and hundreds of A/m.

Key words – **basic reference standard, maximum intensity units, electromagnetic field.**

Kravchenko Yu.V., Naboka B.G., Rudakov V.V., Antonets Yu.A., Zolotaryov V.M., Karpushenko V.P. **75**

A resonance testing stand for short high-voltage cable lengths.

A resonance circuit for testing short samples of high-voltage cables is implemented by means of connecting an additional capacitor in parallel to a cable piece to be tested. Calculations and design of the additional capacitor made on the basis of a composite paper-film dielectric are given.

Key words – **short high-voltage cable, resonance testing stand, composite paper-film dielectric capacitor.**