

## ABSTRACTS

### Theoretical electrical engineering and electrophysics

KUCHERJAVAJA I.N. (Kyiv) **Three-dimensional final element simulation of thermal processes in underground cable lines of trenchless laying**

A three-dimensional model of a stationary thermal field computation in two underground three-phase cable lines of trenchless laying and their environment — filling material and natural ground — is considered. Numerical computations by the finite elements method showed that cables' heating is considerably caused by heat conduction of surrounding ground. Temperature distribution in cable lines and on ground surface over them is computed in a case of filling material heterogeneity along cables routing. The method being elaborated can be used at determination of load-carrying capacity of cable lines of underground construction being designed considering inhomogeneous ground characteristics.

BOZHKO I.V., FALKOVSKY N.I. (Kyiv) **Corona discharge on conducting liquid surface and its application for water processing**

Special features of a positive corona discharge influence on water surface in atmosphere depending on its specific conductivity are investigated. It is shown that approximately half of ozone generated in a discharge is adsorbed by water.

A conclusion is made that potable water processing with such a discharge is a prospect method by specific power consumption.

### Conversion of electric energy parameters

OLESCHUK V., YAROSHENKO E. (Kishinev), PROFUMO F., TENCONI A. (Italy) **Voltage synchronization in cascade neutral-point-clamped inverters**

A new method of a synchronous pulse-width modulation is adapted to application in cascade-connected inverters with a midpoint intended for a power asynchronous electric motor control with broken windings.

Systems responses with three basic varieties of a synchronous vector modulation are analyzed and compared.

LIPKOVSKY K.A., MOZHAROVSKY A.G. (Kyiv) **Generalized current dependences in windings of a sectionalized autotransformer of a discrete voltage regulator on parameters of a regulation field**

Generalized expressions for currents in windings of a sectionalized autotransformer of one of possible configurations of transformer-key executive structures (TKES) of a discrete regulator of an alternating voltage are obtained and it is shown that current loading of windings sections is rather different in different operation modes.

BILOKHA D.O. (Kharkiv) **A mathematical model and a control system of a single-phase phase-controllable reactor**

Problems of an adequate pulse mathematical model elaboration and a high-speed of response optimal control system of a phase-controllable reactor are considered. Transmission functions and block diagrams of the proposed model and a control system are presented. The obtained results are tested by means of mathematical simulation of a test circuit. The article may be of interest for scientists and engineers who are concerned with problems of automatic control systems elaboration for static compensators of reactive power.

SCHERBA A.A., KIRIK V.V. (Kyiv) **Special features of software for creation of negative systems of electrotechnical devices control**

Review and analysis of tool software for investigation and synthesis of negative control systems by complex non-linear electro-technical devices is made.

### Electromechanical energy conversion

KLEPIKOV V.B., ASMOLOVA L.V., OBRUCHI V. (Kharkiv) **Stick-slip frictions in electromechanical systems and their removal**

Problems of electromechanical systems dynamics, which operate in a stick-slip mode, are considered. Conclusions about their presence in systems of a submitted control with traditional and

non-traditional circuit adjustments are made.

Possibility of these modes removal by means of a neuron-controller, constructed on the basis of a neuron circuit of a perceptron type, is shown.

AFONIN A.A. (Szczecin, Poland) **Electromechanical power converters with a small gap**

Results of investigation of electric motors with constant magnets excitation and small operating gap are presented. A method of magnetic induction increase in a gap by combined magnetic systems forming on the basis of plane segments of constant magnets and triangular ferromagnetic concentrators of magnetic fluxes is proposed. Results of a computer simulation of magnetic systems are given and it is shown that to increase both magnetic and electric loads in combined magnetic systems is possible that makes them attractive for application at elaboration of high-used electric motors.

DAVYDOV A.N., ONOPRICH L.V., ONOPRICH V.P. (Kyiv) **Determination of the main dimensions of face asynchronous motors at designing**

A method of preliminary determination of the main dimensions of face asynchronous motors at their designing and optimization, which differs from the known ones, is considered. Comparison of values of the main dimensions of face asynchronous motors, computed by the proposed method, with dimensions of produced pattern samples is made.

MALJARA.V. (Lviv) **Dynamics of an electric drive of a rod oil producing plant**

A problem of mathematic simulation of an electric drive dynamics of a rod oil producing plant is considered taking into account an alternating inertia moment and a cyclic law of a load change on the basis of a mathematical model application of a drive asynchronous motor in which an effect of current replacement in a rotor bars and a magnetic drive saturation is considered.

GOLENKOV G.M., BONDAR R.P., MAKOGON S.A., BOGAENKO M.V., POPKOV V.S. (Kyiv) **Simulation of an electric vibrator operation with a coaxial-linear induction motor at different control actions**

A method of computation, which permits to conduct a computer simulation and investigation of electro-technical characteristics and resonance properties of a vibrator with constant magnets at different control actions, is elaborated. Computation of a magnetic-flux linkage is made on the basis of an electromagnetic field problem solution in an active zone of a vibrator. It is shown that a vibrator operation is implemented in a narrow range of supply frequencies — 15–20 Hz the most efficiently.

### Electric power systems and installations

STOGNIY B.S., ROGOZA V.V., SOPEL M.F., GOLUBOV O.Yu. (Kyiv) **Location of a single-phase earthing**

A method of a fault location on a line operating in an insulated neutral network is proposed on the basis of a differential equation describing electromagnetic processes in a single-phase earthing mode.

### Information measuring systems

GRINEVICH F.B., MELNIK V.G. (Kyiv) **About creation of diagnostics bridge information-measuring systems of alternating current and their application in medicine**

Possibilities and advantages of bridge measuring methods application at medical-biological researches are considered. The main requirements to functions and engineering characteristics of bridge diagnostics systems are formulated.

### Pages of the past

GANEFELD R.V. (Kyiv) **To the 50-th anniversary of MHD-conversions investigation of power modes in the National Academy of Sciences of Ukraine**

A short historical essay about investigations of energy MHD — conversion in the National Academy of Sciences of Ukraine, which took place in the Institute of Electrodynamics NASU in 1957, is presented. The main stages of these investigations within the framework of the national program and international co-operation are described.