

ABSTRACTS

Theoretical electrical engineering and electrophysics

SHIDLOVSKY A.K., SCHERBA A.A., PODOLTSEV A.D., KUCHERJAVAJA I.N. (Kyiv), ZOLOTAREV V.M., VASILETS L.G. (Kharkiv) **Computer simulation of wave processes in a high-voltage cable line with heterogeneous parameters**

A method of wave processes computation in a high-voltage cable line with heterogeneous parameters is given in reference to diagnostics problems of a power cable state. The method is based on a numerical solution by the method of finite elements of a system of telegrapher's equations for a multi-wire conductor, which equivalent parameters change in length. It is proposed to use both the results of computation of a field problem in a line cross-section, which is numerically solved by the finite elements method, and analytical expressions to determine values of frequency-dependent equivalent parameters of a line in a wide range of frequency change. Analysis of a short voltage pulse propagation along a cable of 110 kV with insulation of stitched polyethylene containing a zone of heterogeneity is made as an example, and special features of pulse reflection and refraction at this zone passage are shown.

BARANOV M.I. (Kharkiv) **New physical approaches and mechanisms at investigation of processes of electric conduction current forming and distribution in a conductor**

Generalization of new approaches and physical mechanisms in forming and distribution of constant or alternating (pulse) electric conduction current is made on the basis of quantum mechanics positions. Experimental check of the obtained results of electronic waves computation and a macroscopic wave electronic packet in a thin steel wire with constant conduction current is made.

RENDZINYAK S. (Lviv) **Parallel simulation of nonlinear subcircuits by a multirate integration method with their dynamic interaction**

A new method of nonlinear subcircuits matching is shown. This approach solved a stability task of a multirate method of large-scale simulation. Linear equivalence schemes of other nonlinear subcircuits are connected to some subcircuits that parallel integration of subcircuits with deep connections possible.

KOSOBUTSKY P.S., SEGEDA M.S., BABALO G.Sh. (Lviv) **Simulation of dynamic power interchange of electromagnetic oscillator with a medium of ohmic resistance and power source of sinusoidal action and its correlation with vibration spectrum**

A process of power interchange between a charge, which vibrates harmonically in electromagnetic circuit under an effect of an urgent force, and a medium with an ohmic resistance, a source of external influence is investigated. Correlation of these processes with a character of urged oscillations spectra forming is installed.

Conversion of electric energy parameters

VOLKOV A.V., METEL'SKY V.P., LOKHMATOV A.G. (Zaporozhje) **Electromagnetic processes and control in a recuperative asynchronous electric drive with PWM at mains voltage fall-through**

Analysis of electromagnetic processes at mains voltage fall-through is made: efficient algorithms of automatic control by a recuperative asynchronous electric drive with PWM are elaborated in this mode.

KUDIN V.F., TOROPOV A.V. (Kyiv)

Invariant non-linear control of electric drive of a regulation system feeding of a cutting effort of a metal-cutting machine tool by Aizeks-Bellmann method

A problem of a non-linear controller synthesis of a stabilization circuit of a cutting effort of a metal-cutting machine tool, which is invariant to external excitations, is considered. Synthesis of a non-linear suboptimal controller is made at game formulation of a problem. Synthesis procedure is made by means of Aizeks-Bellman method by a "submersion" method application at external excitations presence.

DOCHVIRI D.N., DOCHVIRI I.D., SHINDZHAKASHVILI I.A. (Georgia) **Dynamics of a frequency-controllable asynchronous**

electric drive at discrete control

Problems of optimization of dynamic control processes of a single-circuit system of a frequency-controllable asynchronous electric drive with a discrete velocity controller are considered. Mathematical models of a drive both at presence of a "hard" mechanical valve and at consideration of elastic properties of that valve are drawn up. Transfer functions of controlled systems and controllers in Z-converted form are obtained. Optimum parameters of correctors are determined by pseudofrequency characteristics. Originals of controllable values change because of discrete transfer functions of closed systems are found. Curves of transient processes, obtained by a computer, are given.

YURCHENKO O.M. (Kyiv) **Methods of power supply systems control of combined autonomous electric vehicles**

The article deals with control means and algorithms of power supply systems of combined (hybrid) autonomous vehicles which include an internal combustion engine.

Electric power systems and installations

ZHEMEROV G.G., DOMNIN I.F., ILJINA O.A., TUGAID.V. (Kharkiv) **Power efficiency of current phase correction and compensation of pulsations of active and reactive power in a three-phase system of power supply**

Reserve of possible efficiency increase of a symmetrical three-phase system of power supply is determined by compensation of pulsations of active and reactive power and also of a constant component of reactive power. Matlab model of a power supply system, which permits to compute efficiency considering a diagram shape of active and reactive power, is created.

TANKEVICH E.M., YAKOVLEVA I.V. (Kyiv) **Measurement of currents in three-phase power and electric energy measuring complexes**

Special features of current transformers groups operation and measurement errors of phase currents of high-voltage networks in circuits, extended in measuring complexes of power and electric energy, are investigated. A universal model of three-phase current measurement error, which considers an inner configuration of a measurement circuit, is proposed.

MARCHENKO N.B., MYSLOVICH M.V. (Kyiv) **Special features of statistical processing of observations of cyclic processes in power engineering with simulation application**

A problem of statistical processing of cyclic processes, which accompany operation of power generating units, is considered. An idea of permanent state and simulation methods are used to estimate recurrence parameters of the processes being measured. Reliability of measurement accuracy of information signals is provided with application of sub-Gauss processes class.

Electrotechnological complexes and systems

GLUKHENKY A.I., GORISLAVETS Yu.M. (Kyiv) **Determination of liquid metal pressure in an electromagnetic pump on the basis of Navier-Stokes equations solution**

An eddy flow of liquid metal in a stopper electromagnetic pump is numerically computed with application of K-E turbulence model. Influence of a channel height irregularity of electromagnetic forces density on pressure distribution in liquid metal is investigated.

Information measuring systems in power engineering

MAZMANJAN R.O. (Kyiv) **Structural simulation of magnetic induction meters with switching leads of Hall generator**

A resistive bridge SPICE-model and an adapted model of Hall converter analogies are proposed for structures of magnetic induction meters with automatic correction of a sensor's residual voltage by periodical rearrangement of signal and current pairs of contacts. Simulation results of synthesized hierarchic structures of meters with switching outputs of Hall generator are given.