

## ABSTRACTS

### Theoretical electrical engineering and electrophysics

**SHCHERBA A.A., SHCHERBA M.A. (Kyiv) Modelling and analysis of electric field in dielectric medium disturbed by conductive microinclusions of different dimensions and configurations // Технічна електродинаміка. – 2010. – № 6. – Pp. 3 – 9.** The mathematical model for numerical calculation of low-frequency electric field in dielectric medium subject to its disturbance by different heterogeneous conductive microinclusions was worked out. New laws of sizes' and configurations' effect on the nonuniformity of electric field in dielectric were ascertained. It has been found that the maximum local intensity of electric field and the value of relative intensive volume in dielectric medium are invariant concerning dimensional change of conductive inclusions by preservation of its configurations' similarity.

It is showed that the maximum intensity of electric field in dielectric increases exponentially by length magnification of conductive ellipsoid inclusion along the field and decreases by magnification of inclusion's section perpendicularly to field. It has been found that by magnification of such section of ellipsoid conductive inclusion an intensive volume firstly increases and than decreases regardless of volume gain of inclusion. By decrease of allowable intensity rate of electric field the relation of inclusion's length along the field to its maximum perpendicular section by which the maximum of curve that characterizes the dependence of local intensive volume in isolation to the given correlation occurs, increases.

It has been found that if there are identical microirregularities at the similar conductive inclusions of different dimensions, than the larger the dimensions the greater intensity of electric field and intensive volume occurs in isolation by microirregularity. It has been proved that by heightening of microirregularity at the inclusion's surface the intensity of electric field and intensive volume in isolation increase. *References 16, figures 6.*

**TRETIAKOVA L.D., PODOLCEV A.D. (Kyiv) The analysis of electric field near-by a man in protective clothing made of polymeric material in the presence of surface charge on it // Технічна електродинаміка. – 2010. – № 6. – Pp. 10 – 15.** The mathematical model and the numerical calculation technique on the basis of finite elements method of three-dimensional electrostatic field near-by a man in the presence of surface charge on his protective clothing of polymeric material were considered. To determine the value of surface charge the experimental investigations were conducted. The numerical calculation results of distribution of electric potential and field intensity as well as integral value of electric energy stored in this field are given in this article. *References 12, figures 6.*

### Conversion of electric energy parameters

**LIPKOVSKIY K.O. (Kyiv) Construction duality of transformer-key operation structures of discrete stabilizers and regulators of alternating voltage // Технічна електродинаміка. – 2010. – № 6. – Pp. 16 – 23.** The construction features of transformer-key operation structures (TKOS) of two different alternating voltage converters – discrete regulators and stabilizers are considered. It has been proved that the duality of these converters is traced both by functional task setup and management and by determination of the rational configuration of operation structures. The fullness of its reversibility has been analysed and recommendations for practical selection of topology for each type of converters on basis of comparative evaluation of introduced voltage-current diagrams that visually characterize the calculated installed power of electromagnetic element, have been developed. The capability to construct discrete stabilizers of alternating current has been researched. *References 7, table 1, figures 3.*

**VOLKOV A.V., KOSENKO I.A. (Zaporizhzhya) The improvement of predictive relay-vector control by active current rectifier in induction motor drive with self-commutated inverter // Технічна електродинаміка. – 2010. – № 6. – Pp. 24 – 34.** On the basis of performed analysis of electromagnetic processes in the active current rectifier (ACR), feeding the induction motor drive with self-commutated inverter, the method of predictive relay-vector control by ACR and regulation of the mains current active projection are improved. For the introduced control with usage of imitating modeling the quantitative estimation of reached electromechanical processes for the specified electric drive and its electromagnetic compatibility with supply main is given. *References 11, table 2, figures 4.*

### Electromechanical energy conversion

**MAZURENKO L.I., ROMANENKO V.I. (Kyiv) Induction generator with inverter excitation as the welding arc supply // Технічна електродинаміка. – 2010. – № 6. – Pp. 35 – 39.** The self-contained induction generator with inverter excitation (IGIE) is considered as the welding arc supply. The inverter excitation is realized through valve inverter (VI) patterned after the diagram of self-commutated voltage inverter. The induction generator control is realized by algorithm of single switching of semiconductor keys. To provide the operation of IGIE with the arc resistance values approximate to zero it is purposed to insert an additional resistance into dc circuit. By external characteristic formation the frequency of VI is changed due to voltage or current deviation. The mathematical model of IGIE based on the alignment method and the usage of which gives the opportunity to estimate electromagnetic processes in generator at the loading in the form of welding arc, is considered. The modeling results and the experimental data confirm the capability to use IGIE as the welding arc supply. *References 9, table 1, figures 4.*

**ANTONOV A.E., KIREEV B.G. (Kyiv) Two types of excitation systems of air-gap-wound magnetoelectric engines // Технічна електродинаміка. – 2010. – № 6. – Pp. 40 – 43.** The results of comparative analysis of the collector and traditional types of excitation systems for magnetoelectric energy converters with air-gap-wound stator are introduced. The analysis has been carried out on equal overall dimensions of magnetic systems and masses of high-energy material. The investigation of three-dimensional field models of systems shown that although the higher values of induction could be reached in air gap of collector systems, it does not always lead to the electromagnetic torque growth. The preventing factors of it have been specified. *References 5, table 1, figures 4.*

#### **Electric power systems and installations**

**STOGNIY B.S., KYRYLENKO O.V., DENYSJUK S.P. (Kyiv) Intelligent electric mains of electrical power systems and their technological support // Технічна електродинаміка. – 2010. – № 6. – Pp. 44 – 50.** The problems connected with the development of electrical power engineering in present-day conditions are considered. The analysis of Smart Grid concept and the features of its development is performed. The main technological and technical components of this concept are determined. The problem of admissible solutions' determination for realization of Smart Grid platform in Ukraine subject to the operating time introduced into electric mains has been investigated. *References 32, table 2.*

**BUTKEVYCH O.F., LEVKONJUK A.V., ZORIN E.V., BULANAYA V.S. (Kyiv) About the usage of synchronized measurements of voltage angles from the objects of Interconnected Power System of Ukraine (IPS) by determination of an admissibility of its current modes due to the static stability margin // Технічна електродинаміка. – 2010. – № 6. – Pp. 51 – 58.** This article shows the appropriateness of the usage, in the dispatching centre of Interconnected Power System (IPS) of Ukraine, the precise measurements of voltage vector components (modules and angles) synchronized according to satellite signals of universal time and obtained from power stations and substations of IPS of Ukraine namely from electrical measuring recording devices "Regina-Ch" to control its current modes due to the static stability margin. The results of conducted investigations give the reasons to make appropriate additions to 34.20.575-2002 "Stability of power systems. Recommended practices" that currently in force. *References 20, table 1, figures 1.*

**BONDARENKO V.E., CHERKASHINA V.V., CHEREMISIN N.M. (Kharkiv) Formation of the techno-economic models of overhead transmission lines in market relations and their analysis by means of criterial method // Технічна електродинаміка. – 2010. – № 6. – Pp. 59 – 64.** The components of investments in overhead transmission lines projection and construction subject to market relations that enabled to form techno-economic models of overhead transmission lines which may be used in preproject practice to choose a priority way in designing an object of power supply network having incomplete initial information, are analyzed. By means of criterial method there were analyzed the formed techno-economic models of overhead transmission lines in order to map out an investment strategy for the development of overhead transmission lines of appropriate voltage class. *References 12, table 2.*

#### **Electrotechnological complexes and systems**

**GUDYM V.I., POSTOLYUK A.Y., YURKIV B.M. (L'viv) Analysis of electromagnetic processes in six electrode electric-arc furnace of pulse current // Технічна електродинаміка. – 2010. – № 6. – Pp. 65 – 70.** To supply six electrode arc steel furnace of pulse current with power, the mathematical model in contour coordinates, which enables to perform the modeling of stationary and transient processes and using of which made it possible to study certain energy characteristics in symmetrical modes of arc steel furnace operation. *References 7, table 1, figures 5.*

#### **Information-measuring systems in power engineering**

**MYSLOVYCH M.V., SYSAK R.M., ULITKO O.V. (Kyiv) Simulation modeling of the processes of acoustic emission in solving the problem of electrical equipment diagnostics // Технічна електродинаміка. – 2010. – № 6. – Pp. 71 – 76.** In this article it has been considered the problem of simulation modeling of the processes of acoustic emission accompanying the operation of electrical equipment units. On the basis of mathematical model of linear random processes the structural model of acoustic emission signal measured by piezoelectric transducer that is fixed at the surface of the object of diagnostics, is developed. Thus, it has been shown that simulation modeling of the acoustic emission signals may be realized by means of linear filtration of relaxation single pulse or Poisson momentum flux with some RLC-filter. On the basis of obtained ratios it has been developed special software to carry out a simulation modeling. This software can generate the realizations of acoustic emission signals with different input parameters, show their diagrams and transmit data for postprocessing via other programs. According to the results of modeling the diagnostic characters permitting to identify a technical condition of diagnosable units of electrical equipment are grounded. *References 11, figures 5.*