ABSTRACTS

Theoretical electrical engineering and electrophysics

SHCHERBA A.A., PODOLTSEV A.D., KUCHERIAVAYA I.N. (Kyiv), ZOLOTARIOV V.M. (Kharkiv). **Electrical transport of water polar molecule in the heterogeneous electrical field in polymeric insulation of high-voltage cables** // Технічна електродинаміка. − 2010. − № 5. − Pp. 3−9.

The process of electrical transport of water polar molecules in polymeric insulation of high-voltage cable under the influence of the heterogeneous electrical field that occurs in the water tree area is researched in the article. It is shown that water molecules are "attracted" to water tree point under the development of dielectrophoresis thus forming the local zone of increased humidity level. This may cause insulation accelerated aging. The mathematical model and the method of numerical calculation of the process of electric transport of water polar molecules in polyethylene insulation of power supply cable by the finite-element method taking into account various defects and its structural discontinuity are developed in the article. References 20, figures 8.

VASETSKY Y.M., MAZURENKO I.L. (Kyiv). **Parameters of electromagnetic and thermal processes for approximate mathematical models of high-frequency induction heating of electroconductive bands** // Технічна електродинаміка. − 2010. − № 5. − Pp. 10−17.

Based on the analysis of electromagnetic and thermal processes of high-frequency induction heating of metal bands nondimensional parameters allowing to develop approximate mathematical models of such processes are determined in the article. For thermal processes the optimal conditions when temperature distribution through band thickness is homogeneous and thermal conductivity along its surface is insignificant are considered in the article. The robustness of such models is shown on the basis of specific calculations. References 8, table 3, figures 6.

BARANOV M.I. (Kharkiv). **Approximate calculation of maximum plasma temperature in high-current electric spark channel of high-voltage air pressure commutator** // Технічна елек-тродинаміка. − 2010. − № 5. − Pp. 18−21.

Ratios for approximate calculation of maximum electron temperatures T_{me} in electric spark plasma channel between electrodes of high-voltage high-current air pressure commutator are given in the article. It is shown that results of temperature calculation T_{me} correlate with experimental data for its direct measurements in low-temperature plasma of high-current electric sparks that occur in air discharge gaps of high-voltage commutators with metal electrodes. References 15, figures 2.

Conversion of electric energy parameters

KHALIKOV V.A., LYPKIVSKY K.O. (Kyiv). **Commutation processes and its organization in transformers** // Технічна електродинаміка. − 2010. − № 5. − Pp. 22−30.

The transient processes occuring within primary winding commutation of a transformer as a result of its magnetic core saturation are considered in the article. The visual process simulation by the use of MATLAB software package is performed and means of minimization or extreme conditions compensation are suggested. References 4, figures 11.

Electromechanical energy conversion

VASKOVSKY Y.N., GERASKIN A.A. (Kyiv). **Vibroexcited electromagnetic forces in short-circuit asynchronous motors involving damages in their construction** // Технічна електродинаміка. − 2010. − № 5. − Pp. 31−38.

The field mathematical model for the analysis of vibroexcited electromagnetic forces in short-circuit asynchronous generators involving damages in their construction is considered in the article. The interrelation between relative increase of motor vibration level and its mode of failure is determined in the article. The proposed diagnostic technique of its technical state is based on such interrelation. References 6, figures 4.

Electric power systems and installations

KYRYLENKO O.V., PAVLOVSKY V.V., LUKYANENKO L.M., ZAICHENKO V.B. (Kyiv). **"Kiev Ring" power system voltage states analysis for the existing and prospective network of the Integrated Ukrainian Power System** // Технічна електродинаміка. − 2010. − № 5. − Pp. 39−46.

The operation conditions of Kyiv Ring 330 kV networks of Central Electric Power System by their voltage levels for current and prospective network of the Integrated Ukrainian Power System are considered in the article. The most critical operation conditions and buses by the voltage level for the year 2008 are determined, the influence of network construction (until year 2015) on abovementioned operation conditions is analysed, the appropriate measures for voltage stability provision in Central Electric Power System of the Integrated Ukrainian Power System are suggested in the article. References 9, table 3, figures 4.

ZHURAKHIVSKY A.V., KINASH B.M., YATSENKO A.Y., MASLYAK R.Y. (Lviv). **Analysis of reliability of voltage transformers operation under ferroresonant conditions** // Технічна електродинаміка. − 2010. − № 5. − Pp. 47−51.

The question of the ferroresonant processes that appear in electrical networks with the voltage of 6-35 kV and their negative influence on the voltage transformers operation is considered in the article. The main principles for assessment of operation reliability of the voltage transformers are given in the article. References 4, table 1, figures 3.

BASOVA A.V., IVANKOV V.F. (Zaporizhzhya). **Temperature calculation in limb sections of magnetic systems of transformers and inductors** // Технічна електродинаміка. − 2010. − № 5. − Pp. 52−60.

The temperature calculation in transformer limb section in package groups separated by cooling channels is considered in the article. For the rectangle with anisotropic thermal conductivity and mixed-boundary conditions that is equivalent to the package group, solutions by finite integral transformation and variables separation methods are suggested. Numerical simulation results for packages with stepped configuration of external boundaries as well as insulation and for calculation of 3-d losses distribution and heatings in conducting elements of inductor limb are given in the article. References 11, table 1, figures 9.

VOLKOV A.V., METELSKY V.P., VOLKOV V.A. (Zaporizhzhya). **Analysis of functioning and energy efficiency of power active filter for four-wire three-phase AC voltage networ**k // Технічна електродинаміка. − 2010. − № 5. − Pp. 61−68.

The article is dedicated to the analysis of electromagnetic processes in the power active filter with relay and vector regulation. The quantitative evaluation of network capacity coefficient, skewness of network phase currents and capacity losses reduction in the four-wire AC voltage network with the use of power active filter was carried out. References 11, table 3, figures 6.

VOVCHENKO A.I., BOHUSLAVSKY L.Z., MYROSHNYCHENKO L.N. (Mykolaiv). **Trends in development of high-powered high-voltage pulse current generators in the Institute of Pulse Processes and Technology of Ukraine (review)** // Технічна електродинаміка. − 2010. − № 5. − Pp. 69−74.

The article is dedicated to the research analysis of high-powered high-voltage pulse current generators developed in the Institute of Pulse Processes and Technology of Ukraine within the last 40 years. The main technical characteristics and peculiarities of the best equipment models developed in the Institute within this time and basic approaches for future development of the generator construction for electrical discharge technologies are considered in the article. References 18, table 1, figures 3.

Information-measuring systems in power engineering

BRAHYNETS I.A., ZAITSEV E.A. (Kyiv). **Dynamic characteristics of phase laser vibration sensor** // Технічна електродинаміка. − 2010. − № 5. − Pp. 75−79.

The block diagram of phase laser vibration sensor used for measurement of movements and low-frequency vibrations of diffusely reflecting objects is considered in the article. The sampling frequency of the analog-to-digital converter taking into account the frequency characteristics of low-pass filter is chosen. The random inaccuracy caused by the interference effect is evaluated. The results of experimental research of laser vibration sensor model are given in the article. References 20, table 1, figures 2.