

# Abstracts

## Electrical Mashines and Apparatus

Baisha A.I., Kozlov V.V., Bratkovskaya K.A., Nabokova O.V.

**Calculation of oil speed in prismatic channels of power oil transformers with cylindrical windings.**

The article presents calculations of oil flow velocity in power oil transformers. Results for rectangular and prismatic channels are obtained. They may be used for increasing accuracy of determination of temperature distribution in the windings and for calculating the maximum temperature.

**Key words** – power oil transformers, oil speed, maximum temperature.

Branspiz Yu.A., Polyachenko E.Yu.

**Application of a conformal mapping method to bipolar electromagnet rational geometry determination.**

The paper presents results of optimum geometrical dimensions determination for U-type electromagnetic systems in terms of maximum product of intensity over the central pole and its gradient and in terms of maximum intensity gradient.

**Key words** – U-type electromagnetic systems, optimum geometrical dimensions, conformal mapping method.

Grechko M.V., Dyachenko V.V.

**Ways of improvement of specific indexes of valve inductor generators.**

Analysis of the basic directions of improvement of specific indexes of valve inductor generators is performed.

**Key words** – valve inductor generator, specific indexes improvement, basic directions.

Dubinets L.V., Zorichev A.V., Karzova O.O., Marenich O.L., Ustimenko D.V.

**Requirement for response speed of electric circuit protection apparatus in railroad rolling stock.**

The article considers a problem of response speed of short-circuit current protection apparatus in rolling stock electric circuits. Recommendations on desired figures of protection apparatus actuation time are given.

**Key words** – short-circuit current protection, rolling stock electric circuits, protection apparatus actuation time.

Zhornyak L.B., Osinskaya V.I.

**Research into simulation methods for an on-load tap-changing transformer voltage regulation system to increase power supply quality.**

Problems of the mains voltage quality increase for electric power consumers are investigated. Investigation of a power transformer voltage regulation system with an on-load regulator of PHOA – 110/800 type is made in Matlab (Simulink 4).

**Key words** – on-load tap-changing transformer, mains voltage quality, voltage regulation system, simulation.

Zablodskiy N.N., Ovcharov A.A., Filatov M.A.

5 **Experimental estimation of power processes in the massive rotor of an auger electrothermomechanical energy converter.**

Results of theoretical research on power processes in the massive rotor of an auger electrothermomechanical energy converter are given. Dependences of eddy current intensity distribution on the converter massive rotor surface are obtained, behavior of thermal field distribution is revealed.

**Key words** – auger electrothermomechanical energy converter, massive rotor, power processes, calculation.

7 Klement'ev A.V.

**Research on currents of asymmetrical short circuits in combined contactless synchronous generators.**

Calculation peculiarities for currents of asymmetrical short circuits in contactless synchronous generators with combination over magnetic circuit and inductor windings are studied.

**Key words** – contactless synchronous generator; combination over magnetic circuit and inductor windings, asymmetrical short circuits.

Klimenko B.V.

9 **International Electrical Vocabulary – Ukrainian prospects.**

Publication of selected translation from section 441 - *Switchgear, controlgear and fuses* – of International Electrical Dictionary (IED) into Ukrainian continues. This time we introduce the Ukrainian for sections 441-15 – *Parts of switching devices* – and 441-16 – *Operation*.

**Key words** – International Electrical Dictionary, section 441-15 – *Parts of switching devices*, section 441-16 – *Operation*, terms and definitions, translation into Ukrainian.

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Komisarenko O.I., Lamanov S.L.

**Influence of current fall curve shape on energy release at load shedding.**

It is shown that in a real parameters range of a switched-off electrical circuit, for essential energy release reduction in loading it is necessary to improve the shape of  $i(t)$  curve and to increase switching surge voltage coefficient up to maximum permissible level, other conditions equal. The analysis is performed in relative units.

**Key words** – switched-off electrical circuit, energy release reduction, current fall curve shape.

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Kuz'min V.V., Shpatenko V.S.

**On a problem of calculation of power action of magnetic core on windings in electric machines.**

A comparative analysis of results of unconventional theoretical approaches application to solving a problem of calculation of magnetic core action on windings in electric machines is performed under condition of magnetic field induction being equal to zero in the zone of the winding location ("paradoxes of transformer and generator").

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*Key words* – magnetic core action, electric machine winding, unconventional theoretical approaches, comparative analysis.

*Limonov L.G.*

**Peculiarities of an asynchronous electric motor application to a winder drive.**

The article is devoted to analysis of application of an asynchronous electric motor with a squirrel-cage rotor to electric drive of a rolling mill strip winder or a rolled metal processing line, with utilization of different motor speed frequency control systems.

*Key words* – asynchronous motor, strip winder, frequency control, application peculiarities.

*Pentegov I.V., Rymar S.V., Volkov I.V., Larchenko B.B., Levin M.*

**New three-phase autotransformer phase-shifting devices for higher current harmonics suppression.**

New phase-shifting autotransformer devices of higher current harmonics suppression which can be used in three-phase electrical networks without the neutral at work with 12-pulse rectifier circuits and with evenly-distributed nonlinear loads are developed. The new design of the devices improves weight-and-dimension parameters and technical and economical characteristics due to locating windings only on the edge rods of the magnetic

circuit, the central rod free.

*Key words* – power quality, current harmonics, autotransformers, “hexagon” circuitry, “rhomb” circuitry, “flags” circuitry, 12-pulse rectifiers.

*Pleshkov P.G., Pleshkov S.P., Kotysh A.I., Soldatenko V.P.*

**Power supply of agricultural consumers on the basis of a complex electrical power system with utilization of renewable energy sources.**

The article considers and analyzes efficiency of utilization of the most promising renewable energy sources for power supply of agricultural consumers in the context of the new Energy Policy of Ukraine.

*Key words* – renewable energy sources, power supply system, tariff system.

*Teterko O.A.*

**Results of operational tests of recovered electric contacts of ekg-8 contactors in alternating current electric locomotives.**

In the work, results of operational tests of electric contacts of AC locomotive contactors EKG-8 are presented, the contacts recovered through brazing with different materials. Results of measurement of transitional resistance of the main and break contacts after exploitation are given.

*Key words* – electric contacts, contact materials, main and break contacts, contact brazing.

## High Electrical and Magnetic Field Engineering

*Baranov M.I., Nosenko M.A.*

**A 2D electrothermal problem for the metallic skin of an aircraft under lightning action.**

In terms of a 2D temperature field approximation, results of improved analytical calculation of temperature overshoot in the high-current spark channel lock-in zone of a lightning on a flat surface of aircraft metallic skin are presented. It is shown that, due to electrothermal action, the 2/50 $\mu$ s-form pulse component of the lightning full current of 200 kA amplitude and 500  $\mu$ s duration only causes local near-surface destruction of the aluminum wall of the skin, while the constant component of the lightning full current of 200 A amplitude and 1 s duration may result in the skin fusion to significant depth.

*Key words* – lightning, lightning channel, pulse and constant components of lightning current, temperature, metallic skin, aircraft.

*Boyko M.I., Bortsov A.V., Evdoshenko L.S., Zarochentsev A.I., Ivanov V.M.*

**Utilization of pulsed corona discharge with enlarged ionization zone for toxic gaseous waste conversion.**

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A plant for conversion of toxic gaseous waste by means of pulse corona discharge with enlarged ionization zone of working voltage up to 70 kV, pulse repetition frequency up to 2500 pulses per second, and low power inputs is presented. The plant is designed to work in industrial facilities where conversion of gaseous waste is required. Pulse corona discharge allows avoiding undesirable heating of the gas being converted.

*Key words* – pulsed corona discharge with enlarged zone of ionization (PCDEZI), toxic gaseous waste, plant for conversion of toxic gases.

*Brzhezitsky V.A., Masluchenko I.N., Trotsenko E.A., Hominich V.I.*

**Experimental research on electric strength of a high-voltage bushing with combined insulation.**

Features of a high-voltage toroidal-type transformer bushing with combined insulation are considered. Experimental equipment and measurement procedure are described.

*Key words* – high-voltage toroidal-type transformer, bushing, combined insulation.

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## Electric stations

*Voronovskiy G.K., Sergeev S.A., Starkov K.A., Abashkina O.S.*

**Estimation of marginal increment of electrical load in distributing network 110 kV caused by domestic load growth.**

Necessary investments for distributing network 110 kV development are estimated. A sequence of

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stages aimed at reconstruction of the network components that allow to increase their transmitting capability is proposed. A marginal increment of electrical load that permits functioning of the network without reconstruction is evaluated.

*Key words* – domestic electrical load, distributing network reconstruction.