

Theoretical and scientific-practical journal

ELECTRICHESTVO

(ELECTRICITY)

ESTABLISHED IN JULY 1880

№ 5, 2017

FOUNDERS

Russian Academy of Sciences
(the Division of Power Engineering, Mashinary Construction,
Mechanical and Control Processes)
Russian Scientific-Technical Society of Power Engineers
and Electrical Engineers

THE EDITORIAL BOARD OF THE JOURNAL ELEKTRICHESTVO

**Editor-in-Chief Pavel A. Butyrin, Corresponding Member
of the Russian Academy of Sciences, Moscow Power Engineering Institute (MPEI)**

Section for Theoretical Principles of Electrical Engineering, Converter Systems, and Electrical Materials

P.A. Butyrin (Moscow), Corresponding Member of the Russian Academy of Sciences, MPEI, Section Chairman; **V.N. Kozlov** (St. Petersburg), Dr. Sci. (Eng.), Professor, St. Petersburg State Polytechnic University; **N.V. Korovkin** (St. Petersburg), Dr. Sci. (Eng.), Professor, St. Petersburg State Polytechnic University; **A.A. Koroteyev** (Moscow), Academician of the Russian Academy of Sciences, Moscow Aviation Institute; **A.N. Lagar'kov** (Moscow), Academician of the Russian Academy of Sciences, Institute of Theoretical and Applied Electrodynamics; **F. Rachidi-Haeri** (Lausanne), Professor, Federal Polytechnic Institute in Lausanne (Switzerland); **Yu. K. Rozanov** (Moscow), Dr. Sci. (Eng.), Professor, MPEI; **S.Ye. Ryvkin** (Moscow), Dr. Sci. (Eng.), Institute of Control Problems, Russian Academy of Sciences; **S.V. Serebryannikov** (Moscow), Dr. Sci. (Eng.), Professor, MPEI.

Scientific Editor **B.N. Yevseyev**

Section for Electric Power Engineering

V.A. Stroev (Moscow), Dr. Sci. (Eng.), Professor, MPEI, Section Chairman; **N.I. Voropai** (Irkutsk), Corresponding Member of the Russian Academy of Sciences, Institute of Energy Systems, Siberian Division, Russian Academy of Sciences; **F.L. Kogan** (Moscow), Dr. Sci. (Eng.); **Yu.N. Kucherov** (Moscow), Dr. Sci. (Eng.), OJSC "System Operator of the Unified Energy System"; **N.L. Novikov** (Moscow), Dr. Sci. (Eng.), OJSC "Scientific and Technical Centre of the Federal Grid Company of the Unified Energy System".

Scientific Editor **L.S. Kudinova**

Section for High-Voltage Engineering, Electrical Apparatuses, and Transformers

G.S. Belkin (Moscow), Dr. Sci. (Eng.), All-Russian Institute of Electrical Engineering; **A.R. Koryavin** (Moscow), Dr. Sci. (Eng.), All-Russian Institute of Electrical Engineering; **V.A. Rakov**, Professor and Co-Director of ICLRT University of Florida (USA); **V.Yu. Khomich** (Moscow), Academician of the Russian Academy of Sciences, Institute of Electrophysics and Electric Power Engineering, Russian Academy of Sciences.

Scientific Editor **L.S. Kudinova**

Section of Electrical Machines

V.Ya. Besspalov (Moscow), Dr. Sci. (Eng.), Professor, MPEI, Section Chairman; **K.L. Kovalev** (Moscow), Dr. Sci. (Eng.), Professor, Moscow Aviation Institute; **Yu.G. Shakaryan** (Moscow), Dr. Sci. (Eng.), Professor, OJSC "Scientific and Technical Centre of the Federal Grid Company of the Unified Energy System".

Scientific Editor **B.N. Yevseyev**

Section of Electric Drives and Automation of Technological Processes

A.B. Krasovskii (Moscow), Dr. Sci. (Eng.), Professor, Moscow State Technical University, Section Chairman; **E. Baake** (Hannover), Professor Dr.-Eng., Leibniz University of Hannover (Germany); **V.B. Demidovich** (St. Petersburg), Dr. Sci. (Eng.), Professor, St. Petersburg University of Electrical Engineering; **N.D. Polyakhov** (St. Petersburg), Dr. Sci. (Eng.), Professor, St. Petersburg University of Electrical Engineering.

Scientific Editor **B.N. Yevseyev**

Deputy Editor-in-Chief **B.N. Yevseyev**

Executive Secretary **L.S. Kudinova**

Literature Editor **T.P. Aleksandrova**

Junior Editor **N.V. Chechunova**

Computer-aided make-up **N.N. Merzlyakov**

Translator **V.I. Filatov**

Editorial office address: Moscow Power Engineering Institute, room Z-111 (Department for Theoretical Principles of Electrical Engineering), Krasnokazarmennaya, 14, Moscow, 111250 Russia

tel/fax (495) 362-7485

E-mail: etr1880@mail.ru; etr1880@mpei.ru

<http://electro.elpub.ru/>

Full text articles in PDF format available on the website of the

Scientific Electronic Library: www.elibrary.ru

Publisher of the journal:

Moscow Power Engineering Institute

ЕЖЕМЕСЯЧНЫЙ ТЕОРЕТИЧЕСКИЙ И НАУЧНО-ПРАКТИЧЕСКИЙ ЖУРНАЛ

**УЧРЕДИТЕЛИ: РОССИЙСКАЯ АКАДЕМИЯ НАУК (Отделение энергетики, машиностроения, механики
и процессов управления),
РОССИЙСКОЕ НАУЧНО-ТЕХНИЧЕСКОЕ ОБЩЕСТВО ЭНЕРГЕТИКОВ И ЭЛЕКТРОТЕХНИКОВ**

СОДЕРЖАНИЕ**CONTENTS**

Лазукин А.В., Кривов С.А. Коаксиальная система с плазмогенерирующим эмиттером на поверхностном разряде	4	A.V. Lazukin and S.A. Krivov, The Coaxial System Involving a Plasma Generating Emitter Based on the Surface Discharge Effect	4
Гуревич В.И. Особенности испытания электронного оборудования энергосистем на устойчивость к электромагнитному импульсу ядерного взрыва	11	V.I. Gurevich, Peculiarities of Testing the Power System Electronic Equipment for Stability to a Nuclear Explosion Electromagnetic	11
Ставинский А.А., Авдеева Е.А., Пальчиков О.О., Ставинский Р.А. Обобщенный метод структурно-параметрического синтеза электромагнитных систем электрических машин и индукционных аппаратов. Ч. 2. Результаты сравнительного анализа основных вариантов электромагнитной системы асинхронного короткозамкнутого двигателя	18	A.A. Stavinsky, E.A. Avdeeva, O.O. Pal'chikov, R.A. Stavinsky, A Generalized Method for Structural-Parametric Synthesis of the Electromagnetic Systems of Electrical Machines and Induction Apparatuses. Part 2. Results from Comparative Analysis of the Basic Versions of Making the Electromagnetic System of a Squirrel-Cage Induction Motor.	18
Лазовский Э.Н., Пантелеев В.И., Пахомов А.Н., Федоренко А.А. Математическая модель асинхронной машины в полярных координатах с учетом эффекта вытеснения тока ротора	28	E.N. Lazovsky, V.I. Panteleyev, A.N. Pakhomov, A.A. Fedorenko, Mathematical Models of an Induction Machine in Polar Coordinates Taking into Account the Rotor Current Displacement Effect	28
Афанасьев А.А. Потери от вихревых токов в массиве постоянных магнитов магнитоэлектрических вентильных двигателей	35	A.A. Afanas'yev, Eddy Current Losses in the Permanent Magnets of Switched Permanent-Magnet Motors	35
Афонин С.М. Передаточные функции электромагнитоупругих актюаторов наноперемещений мехатронных систем	40	S.M. Afonin, The Transfer Functions of Electromagnetically Elastic Nanodisplacement Actuators for Mechatronic Systems.	40
Аполлонский С.М., Куклев Ю.В. Вхождение электрической дуги в область интенсивного гашения в электрических аппаратах	46	S.M. Apollonsky and Yu.V. Kuklev, Setting Up Conditions for Driving Electric Arc into an Intense Quenching Zone	46
Новиков Г.К., Федчишин В.В. Электрически активные центры захвата носителей заряда в диоксиде кремния SiO ₂ и кристаллах слюды	57	G.K. Novikov and V. V. Fedchishin, Electrically Active Charge Trapping Centers in SiO ₂ and Mica Crystals	57
Миронов Ю.М. Анализ влияния инерционности электрической дуги на характеристики дуговых печей	62	Yu. M. Mironov, Analyzing the Effect the Electric Arc Inertia Has on the Arc Furnace Performance Characteristics.	62
ХРОНИКА		CHRONICLE	
Миронов Юрий Михайлович (К 80-летию со дня рождения)	67	Mironov Yurii Mikhailovich (to Mark the 80th Anniversary)	67
Глускин Игорь Захарович (Некролог)	68	Gluskin Igor Zakharovich (Obituary)	68