

Theoretical and scientific-practical journal

ELECTRICHESTVO

(ELECTRICITY)

ESTABLISHED IN JULY 1880

№ 12, 2016

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

ИЗДАЕТСЯ С ИЮЛЯ 1880 ГОДА

ЭЛЕКТРИЧЕСТВО

12
ДЕКАБРЬ
2016

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

Фархадзаде Э.М., Мурадалиев А.З., Фарзалиев Ю.З. Оценка точности показателей надежности оборудования электроэнергетических систем по ограниченному статистическим данным	4	E.M. Farkhadzade, A.Z. Muradaliyev, Yu.Z. Farzaliyev, Evaluating the Accuracy of Electric Power System Equipment Reliability Indicators from a Limited Statistical Data	4
Шаров Ю.В. Нелинейное модальное взаимодействие в электроэнергетических системах	13	Yu.V. Sharov, The nonlinear modal interaction in electric power systems.	13
Ефремов Д.Г., Глускин И.З. Повышение динамической устойчивости электростанции с помощью накопителей энергии	20	D.G. Yefremov, I.Z. Glouskin, Transient Stability Increasing with the Help of Energy Storage Systems	20
Желтов В.В., Копылов С.И., Копылова Л.Н., Липа Д.А., Попова М.В. Влияние секционирования на потери в устройствах переменного тока с бифиларными высокотемпературными сверхпроводящими обмотками	27	V.V. Zheltov, S.I. Kopylov, L.N. Kopylova, D.A. Lipa, M.V. Popova, The Effect of Segmentation on the Losses in AC Devices Containing Bifilar HTSC Coils.	27
Джэндубаев А.-З.Р., Барахоев Р.Ю., Джэндубаев Э.А.-З. Разработка модели классической машины двойного питания с конденсаторным самовозбуждением и последовательной емкостной стабилизацией напряжения	34	A.-Z. R. Dzhendubayev, R. Yu. Barakhoyev, and E. A.-Z. Dzhendubayev, Elaborating the Model of a Classic Double-Fed Machine with Capacitor Self-Excitation and Series Capacitive Stabilization of Voltage for Computer-Aided Designing	34
Сандомирский С.Г. Расчет намагниченности сталей на частных петлях гистерезиса по основным магнитным параметрам предельной петли гистерезиса	39	S.G. Sandomirskii, Calculating of Magnetization of Steels in Partial Hysteresis Loops Based on the Major Hysteresis Loop Main Magnetic Parameters	39
Реутов Ю.Я. Инверсия виртуального размагничивающего коэффициента при локальном намагничивании	44	Yu.Ya. Reutov, Inversion Virtual Demagnetizierien Factor at Local Magnetization	44
ИЗ ИСТОРИИ ЭЛЕКТРОТЕХНИКИ		FROM THE HISTORY OF ELECTRICAL ENGINEERING	
Веселовский О.Н. Юбилей электропередачи трехфазным током	50	O.N. Veselovskii, Jubilee Power Tree-Phase Current	50
ХРОНИКА		CHRONICLE	
Ольгерд Владиславович Слежановский (Некролог)	53	Ol'gerd Vladislavovich Slezhanovskii (Obituary)	53
Указатель материалов, опубликованных в 2016 г.	55	List of Publication 2016	55
Алфавитный указатель авторов статей	62	Alphabetical Index.	62