

2022 4th International Youth Conference on Radio Electronics, Electrical and Power Engineering (REEPE 2022)

**Moscow, Russia
17-19 March 2022**



**IEEE Catalog Number: CFP22Q34-POD
ISBN: 978-1-6654-1435-7**

**Copyright © 2022 by the Institute of Electrical and Electronics Engineers, Inc.
All Rights Reserved**

Copyright and Reprint Permissions: Abstracting is permitted with credit to the source. Libraries are permitted to photocopy beyond the limit of U.S. copyright law for private use of patrons those articles in this volume that carry a code at the bottom of the first page, provided the per-copy fee indicated in the code is paid through Copyright Clearance Center, 222 Rosewood Drive, Danvers, MA 01923.

For other copying, reprint or republication permission, write to IEEE Copyrights Manager, IEEE Service Center, 445 Hoes Lane, Piscataway, NJ 08854. All rights reserved.

****** This is a print representation of what appears in the IEEE Digital Library. Some format issues inherent in the e-media version may also appear in this print version.***

IEEE Catalog Number:	CFP22Q34-POD
ISBN (Print-On-Demand):	978-1-6654-1435-7
ISBN (Online):	978-1-6654-1434-0

Additional Copies of This Publication Are Available From:

Curran Associates, Inc
57 Morehouse Lane
Red Hook, NY 12571 USA
Phone: (845) 758-0400
Fax: (845) 758-2633
E-mail: curran@proceedings.com
Web: www.proceedings.com

CURRAN ASSOCIATES INC.
proceedings
.com

TABLE OF CONTENTS

POWER, ENERGY, AND INDUSTRY APPLICATIONS

COMPREHENSIVE COMPARISON OF THE APPLICATION OF DYNAMIC OPTIMIZATION ALGORITHMS FOR LFC OF A DOUBLE AREA SYSTEM WITH THE PENETRATION OF RENEWABLE ENERGY SOURCES	3
<i>Mohamed Issam A. Elrefaei Ali, Ahmed A. Zaki Diab, Ahmed A. Hassan, Mahmoud A. Mossa, Kotin A. Denis</i>	
HARMONIC MITIGATION USING HYBRID CONTROL METHOD IN ENERGY STORAGE INTEGRATED MICROGRID	11
<i>Ibrahim Alsaeed, Md Shafiullah</i>	
COORDINATED VOLTAGE AND REACTIVE POWER CONTROL OF POWER SYSTEM WITH WIND FARMS AND SVCs AS THE ORPD PROBLEM.....	19
<i>Vadim I. Zakutsky, Magomed G. Gadzhiev</i>	
IMPACT OF OPERATION MODE IN TERMS OF REACTIVE POWER REGULATIONS ON TECHNICAL CONDITION AND RELIABILITY OF GENERATING EQUIPMENT OPERATION	25
<i>Sergey Lenev, Anton Vivchar, Andrey Okhlopov, Vladislav Bitney</i>	
ANALYSIS OF THE MAXIMUM ELECTRICAL LOAD OF MULTI-APARTMENT RESIDENTIAL BUILDINGS IN THE POWER SUPPLY SYSTEMS OF CITIES	31
<i>Galaktion V. Shvedov, Ivan A. Morsin, Alyona S. Demidenko, Svetlana A. Kudelina, Grigorij A. Parfenov</i>	
IMPLEMENTATION AND RESEARCH OF OPERATING PARAMETERS OF ENERGY-EFFICIENT ENGINEERING SYSTEMS WITH A SINGLE CIRCUIT OF HEAT ENGINES	37
<i>Aleksey V. Kondrashov, Aleksey A. Trinchenko</i>	
ANALYSIS STUDY FOR THE IRAQI-SYRIAN INTERCONNECTION 400 KV ELECTRICAL NETWORKS	43
<i>Ahmed S. Al-Akayshee, Ibrahim Alwazah, Oleg N. Kuznetsov, Rinat R. Nasyrov</i>	
TECHNO-ECONOMIC STUDY INTRODUCE AN OFF-GRID PV/BIOMASS SYSTEM IN IRAQ USING THE IMPROVED CHAOTIC ELECTROMAGNETIC FIELD OPTIMIZATION	49
<i>Ahmed S. Al-Akayshee, Oleg N. Kuznetsov, Zubkova Irina Sergeevna, Hamdy M. Sultan</i>	
EVALUATION OF THE EFFICIENCY AND RELIABILITY OF THE USE OF HYDROGEN GENERATORS IN THE SCHEMES OF THERMAL POWER PLANTS IN THE CONTEXT OF DIGITALIZATION.....	55
<i>Maksim S. Ivanitckii, Mahsud M. Sultanov, Elena V. Kuryanova</i>	
UTILIZATION OF THE ENERGY STORAGE SYSTEM FOR THE ENERGY ARBITRAGE AND PEAK SHAVING	61
<i>Igor D. Vitlinsky, Gvan Chun Cho, Nikolay N. Smotrov, Kirill R. Bitkulov, Denis D. Umurzakov</i>	
DEVELOPMENT OF SIMULATION MODELS OF TRACTION FOR EVALUATING THE POSSIBILITY OF REDUCING INTERMITTENT CURRENT UNBALANCE	67
<i>Pavel Bordadyn, Yaroslav Marinov, Konstantin Shish, Maksim Silaev, Vladimir Korolev</i>	

DESIGN OF MULTI-SENSORS NODE FOR INDUSTRIAL MONITORING AND SAFETY SYSTEMS.....	73
<i>Essam I. Sobaih</i>	
INTEGRATED PRESENTATION OF EXISTING APPROACHES TO LIMIT OVERVOLTAGES IN 6-35 KV NETWORKS.....	79
<i>Tatiana Lopukhova, Yuliya Zatsarinnaya, Guzel Valeeva, Rustem Gainullin</i>	
DETERMINATION OF MAXIMUM ALLOWABLE STEP VOLTAGE IN AREA OF AIR POWER LINE WIRE DROP.....	85
<i>Ilya Korolev, Andrey Zakrevsky, Dmitry Burdyukov, V. T. Medvedev</i>	
ENVELOPE STATOR CURRENT ANALYSIS OF AN INDUCTION MOTOR FOR SHORT-CIRCUIT FAULT DIAGNOSIS.....	91
<i>Muhammad Deeb, Nikolay F. Kotelenets, Vladimir. B. Bal, Talal Assaf, Ghassan Ibrahim</i>	
THE ON-LOAD VOLTAGE REGULATOR FOR AN OIL-IMMERSED POWER TRANSFORMER.....	97
<i>Alexander V. Gorchakov, Ann M. Stoyanova, Pavel A. Rashitov, Oleg Z. Popkov</i>	
TEST BENCH FOR THYRISTOR CELLS OF ON-LOAD TRANSFORMER VOLTAGE REGULATORS.....	105
<i>Alexander V. Gorchakov, Vladimir I. Maleev, Pavel G. Nakhabin, Sergei Y. Kuzin, Olga G. Gagarina</i>	
CONTROL SYSTEM FOR SEMICONDUCTOR VOLTAGE REGULATORS OF AN ON-LOAD POWER TRANSFORMER.....	111
<i>Alexander V. Gorchakov, Pavel G. Nahabin, Vladimir I. Maleev, Maria I. Fedorova</i>	
ACOUSTIC AND MASS CHARACTERISTICS OF PLATE SILENCERS WITH WEDGE-SHAPED OUTLET FAIRINGS.....	119
<i>A. A Taratorin, A. B. Mukhametov</i>	
SIMULATION OF HEAT EXCHANGE IN COMBUSTION CHAMBER WITH PREMIX BURNER.....	125
<i>Vadim E. Zinurov, Azat A. Galiev, Ilyuza I. Nasyrova, Vitaly V. Kharkov</i>	
MICROBIOLOGICAL STUDIES OF ION EXCHANGE AND COMBINED WATER TREATMENT PLANTS.....	129
<i>A. Yu. Vlasova, A. A. Chichirov, S. M. Vlasov, O. E. Babikov, A. V. Nizamaeva</i>	
APPLICATION OF THE D-DECOMPOSITION METHOD USING ONE PARAMETER TO SELECT TUNING PARAMETERS OF STATIC VAR COMPENSATORS.....	135
<i>Erik Jaramillo-Leon, Rinat R. Karymov</i>	
MODELING OF A DISTRIBUTED ENERGY SYSTEM WITH RENEWABLE GENERATION, DEMAND-SIDE FLEXIBILITY, AND BEHIND-THE-METER BATTERIES.....	141
<i>Daniel A. Perez-Moscote, Mikhail G. Tyagunov</i>	
ASPEN PLUS MODEL OF A POWER-TO-GAS TECHNOLOGY FOR METHANE-HYDROGEN MIXTURE PRODUCTION.....	147
<i>Daniil V. Semin, Aleksandr V. Fedyukhin, Stanislav A. Dronov, Vladislav E. Panarin, Artem E. Savostikov</i>	
INDUCTION METHOD FOR PARAMETERS CONTROL OF CABLE LINES LAYING AT THE ELECTRICITY DISTRIBUTION NETWORK POLYGON.....	153
<i>Rafael R. Askarov, Sergey S. Filimonov, Kirill V. Nikolaev, Rustem N. Mukhametzhonov</i>	

GENERALIZED STOCHASTIC MODEL OF AN AC ARC FOR ANALYZING THE POWER QUALITY	159
<i>Andrey N. Zhurkin, Sergey M. Nekhamin, Michael Ya. Pogrebisskiy, Anastasia V. Molostova</i>	
INFLUENCE OF SURFACE PROPERTIES ON HEAT TRANSFER DURING COOLING UNDER CONDITIONS OF FORCED FLUID FLOW	165
<i>Tatiana A. Gubanova, Arslan R. Zabirov, Irina A. Molotova, Victor V. Yagov</i>	
THE ANALYSIS OF THE TECHNICAL CONDITION OF POWER PLANTS WHEN USING RENEWABLE ENERGY SOURCES IN THE TERRITORY OF THE RUSSIAN FEDERATION.....	171
<i>V. R. Ivanova, N. V. Rozhentsova, R. R. Dautov</i>	
DEVELOPMENT OF ALGORITHM FOR MONITORING SATURATION AND RESIDUAL MAGNETIZATION OF CURRENT TRANSFORMER MAGNETIC CORE	177
<i>Andrey Yablokov, Galina Filatova, Elena Gotovkina, Dmitry Sharygin, Alexey Evdakov</i>	
ESTIMATED LOADS OF HOUSEHOLD ELECTRICAL APPLIANCES.....	183
<i>Galaktion V. Shvedov, Ivan A. Morsin, Alyona S. Demidenko, Svetlana A. Kudelina, Grigoriy A. Parfenov</i>	
DEVELOPMENT OF A LITHIUM BATTERY WITH A SOLID POLYMER ELECTROLYTE.....	189
<i>Aleksey A. Zatsepin, Elizaveta P. Eliseeva, Ivan A. Putsylov</i>	
STUDY OF THE FLOW STRUCTURE STABILITY IN A MULTI VORTEX CONTACT DEVICE	195
<i>Guzel R. Badretdinova, Nurislam F. Sakhibgareev, Vadim E. Zinurov, Ilnur N. Madyshev</i>	
VALIDATION OF THE MODEL OF WATER JET BREAKUP IN LIQUID METAL.....	201
<i>Daria V. Finoshkina, Oleg I. Melikhov</i>	
CALCULATION OF NEW ELECTRICAL LOADS FOR PUBLIC PREMISES INCLUDED IN MULTI-APARTMENT RESIDENTIAL BUILDINGS	207
<i>Yuriy I. Soluyanov, Alexander I. Fedotov, Azat R. Akhmetshin, Vladimir I. Soluyanov</i>	
ANALYSIS OF THE INFLUENCE OF ELECTRICITY QUALITY INDICATORS ON THE OPERATING MODES OF ASYNCHRONOUS MOTORS	213
<i>Abdullo Majidov, Shahboz Hafizov, Muhibullokhujja Zokirov, Shahrom Abdullozoda, Abubakr Azimov, Shamsulkhak Naimov</i>	
MODELING OF THE FORECASTING PERFORMANCE INDICATORS FOR THE POWER EQUIPMENT GENERATING SYSTEMS	219
<i>Mahsud M. Sultanov, Anatoly A. Konstantinov</i>	
DEVELOPMENT AND RESEARCH OF A LITHIUM BATTERY WITH A GEL-POLYMER ELECTROLYTE.....	225
<i>Mikhail A. Beshkarev, Ivan A. Putsylov</i>	
IMPROVING THE ENERGY EFFICIENCY OF GAS PUMPING UNITS BASED ON ABSORPTION HEAT TRANSFORMERS.....	231
<i>Aleksey I. Bartenev, Ildar A. Sultanguzin, Baydaa Bo Dakkah, Peter A. Shomov, Stanislav M. Kulagin, Aleksey N. Koryagin</i>	
METHODOLOGY OF A MULTIFACTORIAL AUTOMATED RESEARCH OF FAULT LOCATION DETERMINATION METHODS ON EHV LINES	237
<i>Andrey Yablokov, Dmitriy Sharygin, Galina Filatova</i>	

INVESTIGATION OF AUTONOMOUS POWER SYSTEM STABILITY IMPROVEMENT METHODS.....	245
<i>Alexandr P. Dolgov, Alexey I. Laktionov, Leonid A. Mikhailishin</i>	
STUDY OF TRANSIENTS IN A PV PLANT IN CASE OF SHORT CIRCUITING IN POWER GRID.....	251
<i>Alexander N. Ovcharenko, Pavel A. Trukhanov, Maxim V. Burmeyster, Ramis V. Bulatov, Rinat R. Nasyrov</i>	
DEVELOPMENT OF AN AUTOMATIC LUMINOUS FLUX CONTROL SYSTEM FOR LED LAMPS.....	257
<i>Alina Denisova, Elmas Sibgatullin</i>	
AN EXTENSION OF THE CHP PLANTS' ADJUSTMENT RANGE WITH THE USE OF PRESSURIZED HEATING SYSTEM WATER STORAGE DEVICES	263
<i>E. Ilyin, D. Levenok, D. Lymarev</i>	
INCREASING THE ENERGY EFFICIENCY OF VENTILATION SYSTEMS HEAT RECOVERY OF WET VENTILATION EMISSIONS IN ROOMS WITH OPEN WATER SURFACES.....	269
<i>Natalia M. Savchenkova, Dmitry A. Kravtsov, Michael S. Purdin, Oleg M. Khlopov</i>	
INVESTIGATION OF EXPERIMENTAL TESTING OF COPPER CHROMIUM ELECTRODE ARCS GENERATED BY VALE DOBKER SCHEME	273
<i>Muhammad Saqib, Yubin Xu, Shojaa A. Aljassar</i>	
EVALUATION OF THE ELECTRICAL ENERGY STORAGE EFFICIENCY FOR INCREASING STABILITY OF AN ELECTRIC-POWER SYSTEM WITH RES	279
<i>Danila A. Averyanov, Maxim V. Burmeyster, Alexei Yu. Martynushkin, Andrew A. Samoylov</i>	
INVESTIGATION OF THE STABILITY MECHANISMS WITH ASYNCHRONOUS MOTORS AUXILIARY OF POWER PLANT AND SUBSTATION WITH DECREASING FREQUENCY.....	285
<i>Abdullo Majidov, Shahboz Hafizov, Muhibullokhujja Zokirov, Shahrom Abdullozoda, Abubakr Azimov, Shamsulkhak Naimov</i>	
ANALYSIS OF PREREQUISITES FOR CHANGING WIND LOAD STANDARDS FOR ELECTRIC GRID FACILITIES	291
<i>Oleg A. Laktionov, Olga E. Kondrateva, Ekaterina V. Fedotova</i>	
PMU-BASED ESTIMATION OF GENERATOR SYNCHRONOUS PARAMETERS THROUGH SIMULATED AND REAL-FIELD SYNCHROPHASOR DATA.....	297
<i>Vadim R. Rafikov, Igor E. Ivanov</i>	
NOVEL DEMAND SIDE-MANAGEMENT STRATEGY FOR SMART GRID CONCEPTS APPLICATIONS IN HYBRID RENEWABLE ENERGY SYSTEMS.....	303
<i>Ali M. Eltamaly, Majed A. Alotaibi, Waleed A. Elsheikh, Abdulrahman I. Alolah, Mohamed A. Ahmed</i>	
DEVELOPMENT OF A PROGRAM FOR CREATION OF THE FUEL AND ENERGY BALANCE OF THE CITY	311
<i>Yuriy V. Yavorovsky, Ildar A. Sultanguzin, Aleksey I. Bartenev, Ivan D. Kalyakin, Aleksey P. Yashin</i>	
ARTIFICIAL INTELLIGENCE-BASED CYCLIC VOLTAMMETRY BEHAVIOR MODEL FOR SUPERCAPACITANCE OF ZINC OXIDE (ZNO) NANOCOMPOSITE	317
<i>Mostafa A. Ebied, Mohamed A. Azim, Ahmed Emad-Eldeen</i>	

SOLAR POWER PLANT FOR ENERGY SUPPLY OF BUILDING	323
<i>Vladislav Y. Chaikin, Ildar A. Sultanguzin, Yuri V. Yavorovsky, Ivan D. Kalyakin, Alexei V. Skorobatyuk, Evgeniy A. Demidov</i>	
EVALUATION OF APPROACHES TO MANAGING THE TECHNICAL CONDITION OF ELECTRIC POWER FACILITIES.....	329
<i>Yuliya Zatsarinnaya, Guzel Valeeva, Marina Shustrova</i>	
SOFTWARE DEVELOPMENT FOR BUILDING SIMULATION MODELS OF DIGITAL TWINS OF TPP EQUIPMENT IN DIAGNOSTIC SYSTEMS	335
<i>Michael Belov, Ivan Shcherbatov, Vladimir Agibalov, Aleksey Dolgushev, Sergey Ziazev</i>	
A NOVEL SCHEME FOR A DIRECTIONAL RELAYING BASED ON IMPEDANCE APPROACH.....	341
<i>Ahmed R. Adly, Said A. Kotb</i>	
FEATURES, ADVANTAGES AND CURRENT PROBLEMS OF THE RUSSIAN POWER SECTOR TRANSITION TO DATA EXCHANGE BASED ON CIM STANDARDS.....	347
<i>Anastasiia Chernysheva, Artem Vanin</i>	
THE IMPACT OF ELECTRICAL INTERCONNECTION BETWEEN COUNTRIES ON THE STABILITY OF ELECTRICAL POWER SYSTEMS	353
<i>Ahmad Alzakkar, Maksimov Victor Vladimirovich, Yuri Samofalov, Ilyasov Ildar, Ilgiz Valeev</i>	
CONCEPTUAL DESIGN OF THE EMERGENCY ENERGY SUPPLY SYSTEM FOR A NEW GENERATION OF AIRSHIPS.....	359
<i>Emanuele Adorni, Anastasiia Rozhok, Roberto Revetria, Sergey Suchev</i>	
VIBRATION DIAGNOSTICS OF THE BRUSH-COLLECTOR ASSEMBLY, AS MEANS OF ASSESSING.....	365
<i>Olga Filina, Khalil Vakhitov, Artyom Starodubets, Olga Salnikova</i>	
STUDY THE IMPACT OF GEOMETRIC PARAMETERS OF GLASS PLATE INSULATORS ON THEIR MOISTURE-DISCHARGE VOLTAGES UNDER ARTIFICIAL POLLUTION	371
<i>Sergey I. Khrenov, Rinat S. Gubaev, Muna Rmmo</i>	
REDUCTION OF THE AMOUNT OF SULFUR IN MODEL MIXTURES CONTAINING CYCLOHEXYL SULFIDE BY ELECTRIC ARC METHOD	377
<i>Roman Lipantev</i>	
ELECTRIC POWER SYSTEM STABILITY CONDITIONS WITH AUTOMATIC VOLTAGE REGULATOR.....	383
<i>Irina S. Zubkova, Oleg N. Kuznetsov</i>	
ENSURING THE TRANSIENT STABILITY OF THE ENERGY INTERCONNECTION CONSIDERING A SHARE OF RES CONNECTED TO THE ELECTRIC GRID-BASED INVERTERS	389
<i>Irina S. Zubkova, Oleg N. Kuznetsov, Danila A. Averyanov</i>	
RISK ASSESSMENT OF EXISTING DAMS.....	395
<i>V. G. Zhelankin</i>	
A NEW THEFT DETECTION APPROACH FOR CYBERATTACKS IN PV GENERATION	401
<i>Nada Eldahshan, Muneeba Asif, Turkey Baajaj, Mostafa F. Shaaban, Ahmed H. Osman, Usman Tariq</i>	

OPTIMAL ALLOCATION OF MOBILE DISTRIBUTED GENERATION FOR PLANNING ISLANDED MICROGRIDS	407
<i>Ahmed A. Shalaby, Mostafa F. Shaaban</i>	

INVESTIGATION OF REACTIVE POWER PARAMETERS IN THE ELEMENTS OF THE POWER SUPPLY SYSTEM.....	413
<i>Azat N. Khusnutdinov, Ivan V. Cherepen'Kin, Marsel'R. Minazov, Ol'Ga A. Filina, Pavel S. Lazarev, El'Vira M. Khusnutdinova</i>	

ANALYSIS OF THE STEP-BY-STEP WATER PURIFICATION OF A COMBINED WATER TREATMENT PLANT AT A HEAT AND POWER COMPLEX.....	417
<i>A. Yu. Vlasova, A. T. Akhmetzyanova, O. E. Babikov</i>	

NUCLEAR AND MECHANICAL SCIENCE APPLICATIONS

DIGITAL ACOUSTICAL MODELS OF STEAM GENERATOR IN VVER-440 NPP	425
<i>K. N. Proskuryakov, E. Afshar, A. V. Anikeev, R. M. Ismail</i>	

EVALUATION OF THE EFFECTIVENESS OF THE HOT WATER LAYER (HWL) IN REDUCING THE POOL TOP RADIATION LEVEL FOR A TYPICAL OPEN POOL RESEARCH REACTOR.....	431
<i>Sahelemariam Tafesse Kitawa, Rowayda F. Mahmoud Abou Alo, Said A. Agamy, Mohsen Abdou Abou Mandour</i>	

INVESTIGATION OF HYDRODYNAMIC PROCESSES INSIDE MULTICYCLONES IN THE INTEGRATED AIR CLEANING DEVICE	437
<i>Malik G. Ziganshin, Gulnaz I. Belyava</i>	

VALIDATION OF THE STEG CODE USING EXPERIMENTS ON TWO-PHASE FLOW ACROSS AN IN-LINE TUBE BUNDLE.....	443
<i>Hossein Abdi, Najmeh J. Ouregani, Oleg I. Melikhov</i>	

INFLUENCE OF SELF-OSCILLATIONS IN VVER COOLANT ON FAILURES FUEL AND CONTROL AND PROTECTION SYSTEMS.....	449
<i>K. N. Proskuryakov, M. V. Manukhin</i>	

MCU SIMULATION OF THE NEUTRONICS CALCULATIONS OF THE IRT-T REACTOR FOR CONVERSION OF HEU TO LEU	455
<i>Shojaa A. Aljassar, Artyom G. Naymushin, Y Xu</i>	

NUMERICAL ANALYSIS OF THE 8-TUBE HYDRAULIC FUEL ASSEMBLY OF AN IRT-T RESEARCH REACTOR.....	461
<i>Shojaa A. Aljassar, Artyom G. Naymushin, Y Xu</i>	

INFLUENCE OF NON-UNIFORM AXIAL POWER DISTRIBUTION ON THE CRITICAL HEAT FLUX IN FUEL ASSEMBLIES OF PRESSURIZED WATER REACTORS	465
<i>Anton G. Zubkov, Dmitry A. Oleksyuk, Evgeniy A. Vertikov, Daniya R. Kireeva, Vyacheslav M. Zorin</i>	

OPENFOAM MODELING OF THERMAL MIXING IN A T-JUNCTION GEOMETRY USING RANS AND LES MODELS	473
<i>Najmeh J. Ouregani, Hossein Abdi, Vladimir I. Melikhov</i>	

THERMOHYDRAULIC ANALYSIS OF FUEL ASSEMBLY OF THE WVER-1000 REACTORS AT REDUCED POWER	479
<i>Mehakdeep Singh, Yubin Xu, Shojaa A. Aljassar</i>	

ON-LINE NUCLEAR MAGNETIC RESONANCE ANALYZER FOR THE PRODUCTION OF NEW EMULSION FUELS	485
<i>V. O. Kozelkova, G. A. Ovseenko, V. I. Karachin, Tran Van Tung, Nguyen Chi Kien, R. S Kashaev</i>	

APPLICATION OF NUCLEAR MAGNETIC RESONANCE FOR THE EXPRESS-CONTROL OF WATER CONCENTRATION	489
<i>V. O. Kozelkova, G. A. Ovseenko, V. I. Karachin, Nguyen Chi Kien, Tran Van Tung, O. V. Kozelkov</i>	

COMPONENTS, CIRCUITS, DEVICES, AND SYSTEMS

CONTROL ALGORITHM FOR HYBRID PV-FUEL CELL ENERGY SYSTEM	497
<i>Nikolay S. Rodkin, Georgiy K. Solovov, Konstantin V. Kryukov, Mikhail G. Kiselev, Nikolay N. Baranov</i>	

ESTIMATION OF THE PARAMETERS OF THE TRAJECTORIES OF RADIO SOURCES IN MULTI-POSITION COMPLEXES BY THE MLE METHOD	503
<i>Alexander Chugunov, Sergey Serov, Roman Kulikov, Vladimir Pudlovskiy, Nikita Petukhov</i>	

INCREASING EFFICIENCY OF SINGLE-PHASE PFC BY DECREASING DYNAMIC POWER DISSIPATION IN TRANSISTOR.....	509
<i>Georgiy V. Roschupkin, Mikhail A. Novikov, Alexander A. Retyunsky, Artem A. Badrutdinov, Maria I. Fedorova</i>	

CALCULATION OF THE CONTROL ANGLE OF THE PHASE SHIFTING TRANSFORMER WITH A NONLINEAR REACTANCE.....	515
<i>Alexey V. Kochergin, Sergey V. Loktionov, Alexey N. Sharov, Alexei Y. Vestfalskii, Grigoriy V. Krupin, Gleb S. Loktionov</i>	

METHOD FOR ASSESSING THE THICKNESS OF THE FATIGUE DAMAGE LAYER OF THE OVERHEAD LINE WIRE DURING ITS OPERATION	521
<i>V. G. Kul'Kov, D. Sh. Norov</i>	

ANALYSIS OF OVERVOLTAGE PROCESSES UNDER SINGLE-PHASE-TO-EARTH FAULT CONDITIONS IN TPP 6–10 KV SWITCHGEAR.....	525
<i>Nikolay Smotrov, Andrey Okhlopkov, Vladislav Bitney</i>	

FEATURES OF HIGH-PRECISION SYNC-SIGNALS FORMATION FOR DISTRIBUTED SYSTEMS BASED ON A SYNCHRONOUS ETHERNET NETWORK	531
<i>Alexander A. Deev, Andrei A. Kalshchikov</i>	

COMPARISON OF LOCAL ULTRA-WIDEBAND RADIO NAVIGATION SYSTEMS ARCHITECTURES	535
<i>Ilya V. Korogodin, Alexander P. Malyshev, Alexander A. Chugunov, Tatyana A. Brovko, Anna Yu. Siziakova, Rodion R Vakhitov</i>	

STRUCTURAL MODEL OF POWER SECTION OF THREE-PHASE ACTIVE RECTIFIER.....	541
<i>Alexey I. Andriyanov, Maksim V. Baranchikov</i>	

FUSED OPTICAL COUPLERS: BICONICAL TAPER.....	547
<i>Pavel V. Bazakutsa, Michael A. Boev, Andrey I. Nikitin</i>	

FUSED OPTICAL COUPLERS: POWER TRANSFER BETWEEN OPTICAL FIBERS.....	553
<i>Pavel V. Bazakutsa, Michael A. Boev, Andrey I. Nikitin</i>	

OPTIMIZATION OF SCHEDULES - TASKS OF CCGT UNIT START-UPS ACCORDING TO THE STEAM PATH CRITICAL ELEMENTS THERMAL STRESS STATE.....	559
<i>Sergey Lenev, Yuri Radin, Andrey Okhlopkov</i>	
INVESTIGATION OF SUPERCONDUCTING CLOSED WINDING PARAMETRIC DEPENDENCES ON CONTACT RESISTANCE.....	565
<i>Boris F. Kuznetsov, Ivan I. Solovev, Egor A. Pavlovich</i>	
SYNTHESIS OF PDR ALGORITHM AND EXPERIMENTAL ESTIMATION OF ACCURACY OF STEP LENGTH ESTIMATION METHODS	571
<i>Nikita I. Petukhov, Vladimir N. Zamolodchikov, Alexander P. Malyshev, Tatyana A. Brovko, Sergey A. Serov, Ilya V. Korogodin</i>	
APPLICATION OF THE GENETIC ALGORITHM TO LOCATE THE REFERENCE POINTS OF THE LOCAL NAVIGATION SYSTEM	577
<i>Roman Kulikov, Natalia Masalkova, Nikita Petukhov, Andrey Boldyrev, Denis Zezin, Maxim Efremov</i>	
OPTIMIZATION OF INTERROGATION SIGNAL FOR SAW-RESONATOR-BASED VIBRATION SENSOR.....	583
<i>Andrey A. Merkulov, Nikita O. Ignat'Ev, Aleksandr S. Shvetsov, Sergei A. Zhgoon, Ksenia E. Lipshits</i>	
INVESTIGATION OF THE CRYSTALLIZATION KINETICS OF THE THIN FILMS FOR THE PHASE CHANGE MEMORY APPLICATION.....	589
<i>Alexey V. Babich, Anastassiya S. Bozhedomova, Dmitriy Yu. Terekhov, Daria D. Glebova</i>	
LARGE-FORMAT 3D PRINTING WITH HARDWARE AND SOFTWARE COMPLEX “ROBOPRINT”	595
<i>Rodion E. Mazaev, Roman S. Kulikov, Vladislav A. Lyovushkin, Michael G. Ivanov, Vladimir A. Danilov, Rodion R. Vakhitov</i>	
DEVELOPMENT OF AN ALGORITHM FOR PROCESSING AND ANALYZING DIGITAL PACKETS OF SV AND GOOSE PROTOCOLS FOR USE IN A MOBILE NETWORK SCANNER	601
<i>Anton A. Ivanov, Ekaterina E. Pashkovskaya, Boris A. Safronov, Alexander K. Ryzhkov, Alexander A. Voloshin</i>	
ANALYSIS OF SYNCHRONOUS REGIMES OF THE BIHARMONIC OSCILLATOR	605
<i>Daniil A. Frolov, Ansar R. Safin, Nikolay N. Udalov, Valery A. Sotskov</i>	

FIELDS, WAVES, AND ELECTROMAGNETICS

EXTERNAL FIELDS BOUNDARIES ESTIMATION OF HIGH-Q SHIELDED DIELECTRIC RESONATOR.....	613
<i>Vladimir M. Gevorkyan, Yuri A. Kasantsev, Aleksandr V. Shutov</i>	
SIGNIFICANT IRREGULARITIES IN THE NRD WAVEGUIDE.....	619
<i>V. V. Krutskikh, A. N. Ushkov, N. O. Strelkov, A. E. Mirzoyan, H. M. Ariqat</i>	

COMPUTING, SIGNAL PROCESSING, AND ANALYSIS

ADAPTIVE PROCESSING AND ANALYSIS OF ELECTROCARDIOSIGNALS IN CHILDREN: AN INTERDISCIPLINARY APPROACH.....	627
<i>Alexander Yu. Tychkov, Artem P. Nazarychev, Yulia N. Komkova, Galina A. Sugrobova, Alan K. Alimuradov</i>	
AN APPROACH TO IMPROVE THE POWER FREQUENCY MEASUREMENT ACCURACY BASED ON THE APPLICATION OF LOW-PASS FILTRATION	633
<i>Andrey N. Serov, Kirill A. Ivanenko, Dmitry A. Chumachenko</i>	
NEUROCRYPTOGRAPHIC BLUETOOTH-ATTACK PREVENTION SYSTEM	639
<i>Larisa Fomchenkova, Alexey Lazarev, Pavel Kharlamov</i>	
APPROACH TO DETERMINING THE POWER AND LOCATION OF TRANSFORMER SUBSTATIONS	645
<i>Vadim A. Ageev, Konstantin A. Dushutin, Dmitriy V. Kazakov, Sergei V. Golobokov</i>	
APPLICATION OF THE GENETIC ALGORITHM IN URBAN DISTRIBUTION NETWORKS TRACKING	651
<i>Vadim A. Ageev, Konstantin A. Dushutin, Dmitriy S. Repeyev, Tatiana Yu. Brostilova</i>	
WAVELET ANALYSIS OF TRANSIENT SIGNALS CAUSED BY COMMUTATIONS IN POWER LINES.....	655
<i>Rustem G. Khuziyashev, Igor L. Kuzmin, Iluza I. Irkagalieva, Ildar A. Minaev</i>	
ESTIMATION OF THE INITIAL PHASE OF A RADIO SIGNAL WITH AN ARBITRARY SHAPE AND UNKNOWN APPEARANCE AND DISAPPEARANCE MOMENTS.....	661
<i>Yury Korchagin, Konstantin Titov, Yury Petrov, Olga Zavalishina</i>	
HARDWARE PROTECTION FOR HIGH VOLTAGE REGULATORS OUTPUT VOLTAGE TRANSFORMERS ON-LOAD	667
<i>Anna A. Arkhireeva, Pavel A. Rashitov, Dmitriy A. Seregin, Nikolay P. Shchepkin</i>	
IMPROVING THE EFFICIENCY OF SPARSE MATRIX CLASS PROCESSING BY USING THE SPM-CSR PARALLEL ALGORITHM AND OPENMP TECHNOLOGY	673
<i>Adnan Adhab K. Al-Saeedi, Shamaeva Olga Yurievna, Teaba W. Khairi</i>	
DEVELOPMENT OF THE SOFTWARE PART OF THE MOBILE SCANNER OF THE DIGITAL SUBSTATION NETWORK USING THE DPKD LIBRARY	677
<i>Anton Ivanov, Boris Safronov, Alexander Ryzhkov, Alexander Voloshin</i>	
ANALYTICAL ESTIMATION OF KALMAN FILTER ERRORS FOR INDOOR POSITIONING SYSTEMS.....	683
<i>Tatyana A. Brovko, Alexander A. Chugunov, Alexander P. Malyshev, Ilya V. Korogodin, Oleg V. Glukhov, Elena V. Silayeva</i>	
RECURRENT MODEL OF BRAIN ACTIVITY BASED ON THE MARKOV CHAIN IN THE TIME DOMAIN.....	689
<i>Rodion Vakhitov, Anton Melanin, Roman Kulikov, Rodion Mazaev, Natalia Masalkova, Maxim Efremov</i>	
RECOGNIZING HUMAN EMOTIONS USING A CONVOLUTIONAL NEURAL NETWORK	695
<i>Yulia A. Alexeevskaya, Maria Skvortsova, Roman A. Alexeevsky</i>	

PROCESSING AND VISUALIZATION OF TOMOGRAPHY SIGNAL WITH AI: DECISION MAKING ON COVID-19.....	701
<i>Denis O. Ishkov, Boris S. Goryachkin, Valery I. Terekhov</i>	
HIGH GAIN, WIDE BAND 1*8 MICROSTRIP PATCH ANTENNA ARRAY AT 28GHZ FOR 5G COMMUNICATION	707
<i>Mohammad Anbar, Mohammad Nassr, Lames Hasan, Elena Vostorgina, Maxim Kolistratov</i>	
QOS BASED ROUTE SELECTION IN CELLULR IP NETWORKS USING PSO	713
<i>Mohammad Anbar, Ali Ahmad, Dima Mohammad, Michail Zakharov</i>	
SIDELOBE CANCELLER PERFORMANCE EVALUATION USING SAMPLE MATRIX INVERSION ALGORITHM.....	719
<i>Mohammad Anbar, Mohammad Nassr, Mohammad Abdallah, Elena Vostorgina, Maxim Kolistratov, Hamid Ali Abed Alasadi</i>	
THE MODELLING OF THE PRODUCTION FACTORS' PREDICTION IN THE RADIO-ELECTRONIC INDUSTRY	725
<i>E. Gorlacheva, P. Drogovoz, I. Omelchenko, V. Shiboldenkov, O. Yusufova</i>	
ANALYSIS OF ALGORITHMS FOR DETECTING THE SPECTRAL PEAKS OF BRAGG DIFFRACTION GRATINGS IN FIBER-OPTIC MEASURING SYSTEMS	731
<i>Dyakonov Andrey Valerevich, Viktor V. Tatarinov, Stanislav A. Chuprikov, Mikhail D. Strakhov, Alexey S. Dutov, Anastasiia Rozhok</i>	
MOVING OBJECTS TRACKING METHOD BASED ON DISCHARGED OPTICAL FLOW	737
<i>Ivan Aleksandrovich Vozvakhov, Mikhail Dmitrievich Strakhov, Vladislav Aleksandrovich Ershov, Marat Yuryevich Agapov, Viktor Viktorovich Tatarinov, Anastasiia Rozhok</i>	
CELLULAR AUTOMATA SIMULATION OF HETEROGENEOUS FREEWAY TRAFFIC FLOW IN A SMART CITY.....	743
<i>Nikita V. Bykov</i>	
<u>GENERAL TOPICS FOR ENGINEERS</u>	
RELIABILITY ASSESSMENT OF SWITCHING PROCESS CONTROL EQUIPMENT.....	751
<i>Svetlana P. Ivanova, Denis A. Pestryaev, Tatyana V. Myasnikova, Oksana V. Sveklova</i>	
APPLICATION OF THE DBSCAN METHOD TO SOLVE THE PROBLEM OF NEW EMPLOYEES ADAPTATION.....	757
<i>M. A. Durova, E. A. Khodunov, A. S. Anikeeva, A. A. Mishin, A. N. Zein, S. V. Borisova</i>	
ANALYSIS OF MULTIVORTEX SEPARATOR OPERATION IN SPRAY BOOTH	763
<i>Andrey V. Dmitriev, Rustem Ya. Bikkulov, Vitaly V. Kharkov, Oksana S. Dmitrieva</i>	
ONE STEP FORMATION OF LASER REDUCED GRAPHENE OXIDE FABRICATION AND CHARACTERIZATION ON NOVEL FLEXIBLE PET BASED SENSITIVE SENSOR	767
<i>Yubin Xu, Shojaa A. Aljassar, Mohammad R. Qasaimeh</i>	
DESIGN, FABRICATION AND CHARACTERIZATION OF FLEXIBLE LASER REDUCED SILICON CARBIDE NANOPARTICLE THERMAL HEATER SENSOR	771
<i>Shojaa A. Aljassar, Y Xu, Mohammad R. Qasaimeh</i>	
DEVELOPMENT OF A RISK-BASED PREDICTIVE MODEL OF EMPLOYEES FATAL INJURIES IN RUSSIAN POWER GRID COMPLEX.....	777
<i>Oleg A. Loktionov, Olga E. Kondrateva</i>	

COLD EXPERIMENT AS A MODEL OF BASALT MELTING.....	783
<i>Konstantin V. Strogonov, Andrey A. Borisov</i>	
DEFORMATION DIAGRAM AND MECHANICAL CONSTANTS OF ELECTRO- TECHNICAL MATERIALS.....	789
<i>T. B. Duishenaliev, T. N. Komissarova</i>	
TEXT CAPTCHA TRAVERSAL WITH CONVNETS: IMPACT OF COLOR CHANNELS.....	795
<i>Denis O. Ishkov, Valery I. Terekhov</i>	
MATHEMATICAL STATEMENT AND SOLUTION OF ENTERPRISE EQUIPMENT MAINTENANCE AND REPAIR SCHEDULING PROBLEM.....	801
<i>Dmitrii A. Gurianov, Konstantin S. Myshenkov, Valery I. Terekhov</i>	
COGNITIVE MODELING OF DIGITAL PRODUCTION FACTORS	807
<i>Alla Brom, Irina Omelchenko, Yuliya Maslennikova</i>	
THE IMPACT OF FIBER REINFORCEMENT ON THE STRENGTH CHARACTERISTICS OF CONCRETE USED FOR THE CONSTRUCTION OF HYDRAULIC STRUCTURES.....	813
<i>Natal'Va Borisovna Mahova, Tatarinov Viktor Viktorovich, Sergey Serov, Novikov Vasiliy Konstantinovich, Alexey S. Dutov, Anastasiia Rozhok</i>	
PROTOTYPING FOR THE DEVELOPMENT OF PRACTICAL SKILLS OF STUDENTS IN AUTOMATION AND ROBOTICS.....	819
<i>Alexander N. Bogdanov, Valery A. Danilov, Ishanberdy A. Hallyyev</i>	

Author Index