# 2016 Dynamics of Systems, **Mechanisms and Machines (Dynamics 2016)**

Omsk, Russia 15 – 17 November 2016



**IEEE Catalog Number: CFP16RAB-POD ISBN**:

978-1-5090-4051-3

## Copyright © 2016 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 publication is a representation of what appears in the IEEE Digital Libraries. Some format issues inherent in the e-media version may also appear in this print version.

 IEEE Catalog Number:
 CFP16RAB-POD

 ISBN (Print-On-Demand):
 978-1-5090-4051-3

 ISBN (Online):
 978-1-5090-4050-6

#### **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



#### A.Z. Abdenov, V.A. Trushin

Novosibirsk State Technical University, Novosibirsk, Russia

FILLING THE SIEM-SYSTEM NODES WITH THE TECHNIQUE FOR CALCULATING OBJECTIVE ASSESSMENT TO IMPROVE THE RELIABILITY OF EXPERT EVALUATION IN THE TECHNIQUE OF THE INFORMATION SYSTEMS SECURITY RISK CALCULATION.....1

Boris N. Abramovich, Yuriy A. Sychev

Electromechanical department Saint Petersburg Mining University Saint-Petersburg, Russia THE CONTROL ALGORITHM FOR ACTIVE AND HYBRID CORRECTION SYSTEMS OF VOLTAGE AND CURRENT WAVEFORMS.....6

A.G. Amelchenko<sup>2</sup>, V.A. Bardin<sup>1,2</sup>, V.A. Vasil'ev<sup>1</sup>, V.D. Krevchick<sup>2</sup>, P.S. Chernov<sup>1</sup>, M.A. Shcherbakov<sup>1</sup> Penza State University, Penza, Russia

<sup>2</sup> Start Production Association named after M. V. Protsenko, Penza, Russia PIEZO ACTUATORS AND PIEZO MOTORS FOR DRIVING SYSTEMS.....11

Yelena G. Andreeva, Irina A. Semina, Andrey S. Orlov

Omsk State Technical University, Omsk, Russia

THE RESERCH OF THREE-DIMENSIONAL MAGNETIC FIELD OF THE HYBRID MAGNETIC SYSTEM IN THE ANSYS MAXWELL PROGRAM.....15

#### A. I. Andriyanov

Bryansk State Technical University, Bryansk, Russia

BOOST CONVERTER NONLINEAR DYNAMICS CONTROL BASED ON MULTI-PARAMETER METHOD OF LINEARIZATION OF THE POINCARÉ MAP.....19

#### A. I. Andriyanov, E. A. Sachenko

Bryansk State Technical University, Bryansk, Russia

STUDY OF NONLINEAR DYNAMICS IN A THREE-PHASE TRANSISTOR CONTROLLED RECTIFIER WITH A PI VOLTAGE CONTROLLER IN REGENERATION MODE.....24

#### Igor V. Anikin

Kazan National Research Technical University named after A.N.Tupolev-KAI, Kazan, Russia INFORMATION SECURITY RISKS ASSESSMENT IN TELECOMMUNICATION NETWORK OF THE UNIVERSITY.....32

#### Igor V. Anikin, Ellina S. Anisimova

Kazan National Research Technical University named after A.N.Tupolev-KAI, Kazan, Russia HANDWRITTEN SIGNATURE RECOGNITION METHOD BASED ON FUZZY LOGIC.....36

#### A.V. Astafiev, A.A. Orlov, D.G. Privezentsev

Murom Institute Vladimir State University, Murom, Russia

METHOD OF CONTROL THE MOVEMENT OF LARGE METAL PRODUCTS WITH THE USE OF ALGORITHMS FOR LOCALIZATION AND RECOGNITION OF BAR CODE MARKINGS.....41

#### A.V. Astafiev, A.A. Orlov, A.V. Provotorov, D.G. Privezentsev

Murom Institute Vladimir State University, Murom, Russia

DEVELOPMENT THE AUTOMATIC MARKING IDENTIFICATION SYSTEM BASED ON TWO-STAGE VISUAL RECOGNITION OF METAL-ROLLING BILLETS.....44 N.V. Astapenko, K.T. Koshekov, P.A. Petrov

The North-Kazakhstan State University n.a. M.Kozybayev, Petropavlovsk, Kazakhstan DESIGN OF THE GRANARY TECHNOLOGICAL PROCESS CONTROL SUBSYSTEM FOR MONITORING OF THE GRAIN VOLUME IN A SILO.....48

Mikhail S. Balabanov<sup>1</sup>, Rustam N. Khamitov<sup>2</sup>

<sup>1</sup>LLC "International Energy Corporation", St. Petersburg, Russia

<sup>2</sup>Omsk State Technical University, Omsk, Russia

MODELING OF THE ATTENUATION OF ELECTROMAGNETIC WAVES FROM THREE-PHASE REACTOR FACTS-DEVICES IN PROTECTIVE SCREENS.....53

Pavel Baranov, Vitalia Baranova, Sergey Uchaikin, Yana Pisarenko
National Research Tomsk Polytechnic University, Tomsk, Russia
CREATING A UNIFORM MAGNETIC FIELD USING AXIAL COILS SYSTEM FOR
CALIBRATION OF MAGNETOMETERS.....58

P.A. Batrakov<sup>1</sup>, A. N. Mrakin<sup>2</sup>, A.A. Selivanov<sup>2</sup>

<sup>1</sup>Omsk State Technical University, Omsk, Russia

<sup>2</sup>a Yuri Gagarin State Technical University of Saratov, Saratov, Russia

NUMERICAL STUDY OF THE NITROGEN OXIDE FORMATION IN NON-CIRCULAR PROFILE FURNACES OF GAS-TUBE BOILERS.....63

S.V. Belim, N.F. Bogachenko, A.N. Kabanov, Yu.S. Rakitskiy

Omsk State University n.a. F.M. Dostoevskiy, Omsk, Russian

USING THE DECISION SUPPORT ALGORITHMS COMBINING DIFFERENT SECURITY POLICIES.....67

S.V. Belim, D.M. Brechka, T.A. Gorbunova, I.V. Schmidt, I.B. Larionov

Dostoevsky Omsk State University, Omsk, Russia

DATA MINING BASED ON AN ARCHAEOLOGICAL GEOINFORMATION SYSTEM ARGIS.....72

S.V. Belim, D.E. Vilkhovskiy

Dostoevsky Omsk State University, Omsk, Russia

USAGE OF ANALYTIC HIERARCHY PROCESS FOR STEGANOGRAPHIC INSERTS DETECTION IN IMAGES.....76

Alexander E. Belodedov, Oleg A. Lysenko

Omsk State Technical University, Omsk, Russia

MODEL DESIGN OF A CONTROLLED DC DRIVE WITH A SUPERCAPACITOR UNIT.....80

Aleksey A. Belsky, Vasiliy S. Dobush

Electromechanical department Saint Petersburg Mining University Saint-Petersburg, Russia OIL WELL ELECTRICAL HEATING FACILITY UTILIZING HEATING CABLE POWERED BY AUTONOMOUS WIND-DRIVEN POWER UNIT.....85

P.V. Belyaev, V.S. Mischenko, D.A. Podberezkin, R.A. Em

Omsk State Technical University, Omsk, Russia

SIMULATION MODELING OF PROTON EXCHANGE MEMBRANE FUEL CELLS.....89

P.V. Belyaev, V.S. Mischenko, D.A. Podberezkin, R.A. Em Omsk State Technical University, Omsk, Russia ESTIMATION OF PHOTOVOLTAIC MODULE SHADING.....94

Y.I. Bityukov, Y.I. Deniskin

Moscow Aviation Institute (national Research University), Moscow, Russia CHAIKIN ALGORITHM AND ITS GENERALIZATION.....99

Yury A. Blinkov<sup>1</sup>, Lev I. Mogilevich<sup>2</sup>

<sup>1</sup>National Research Saratov State University, Saratov, Russia

<sup>2</sup>Volga Region Branch of Moscow State University of Railway Engineering (MIIT), Saratov, Russia WAVE OCCURRENCES COMPUTER MODELING IN TWO GEOMETRICALLY NON-LINEAR ELASTIC COAXIAL CYLINDRICAL SHELLS, CONTAINING VISCOUS INCOMPRESSIBLE LIQUID.....104

Viktor N. Blinov<sup>1</sup>, Victor V. Shalay<sup>1</sup>, Igor S. Vavilov<sup>1</sup>, Valeriy V. Kositsin<sup>1</sup>, Victor I. Ruban<sup>1</sup>, Anton I. Lykyanchik<sup>1</sup>, Pavel S. Yachmenev<sup>1</sup>, Iuri M. Mironov<sup>2</sup>

<sup>1</sup>Omsk State Technical University, Omsk, Russia

<sup>2</sup>Moscow State Technical University N.E Bauman, Moscow, Russia

DESIGN FEATURES AND EXPERIMENTAL RESEARCHES OF AN ARCJET THRUSTER FOR SMALL SATELLITE .....108

Bobkova Anastasya<sup>1</sup>, Porshnev Sergey<sup>1</sup>, Zuzin Vasily<sup>1</sup>, Bobkov Vladimir<sup>2</sup>

<sup>1</sup>Ural Federal University of the First President of Russia B.N. Yeltsin, Yekaterinburg, Russia

<sup>2</sup>Ural State Economic University, Yekaterinburg, Russia

THE APPLICATION OF ENSEMBLE LEARNING FOR DELINEATION OF THE LEFT VENTRICLE ON ECHOCARDIOGRAPHIC RECORDS.....116

Igor V. Bogachkov, Member of IEEE

Omsk State Technical University, Omsk, Russia

EXPERIMENTAL RESEARCHES OF THE BRILLOUIN BACKSCATTER SPECTRUM IN OPTICAL FIBERS AT INFLUENCE OF THE ESSENTIAL STRETCHING FORCES.....120

Igor V. Bogachkov, Member of IEEE

Omsk State Technical University, Omsk, Russia

EXPERIMENTAL RESEARCHES OF BRILLOUIN BACKSCATTER SPECTRUM

IN NON ZERO DISPERSION-SHIFTED OPTICAL FIBERS AT LONGITUDINAL STRETCHING FORCES.....125

Igor V. Bogachkov, Member of IEEE

Omsk State Technical University, Omsk, Russia

EXPERIMENTAL RESEARCHES OF TEMPERATURE DEPENDENCES OF BRILLOUIN BACKSCATTER SPECTRUM IN OPTICAL FIBERS OF VARIOUS TYPES.....130

O. Bolshunova, A. Kamyshian, A. Bolshunov

National Mineral Resources University, Saint-Petersburg, Russia

DIAGNOSTICS OF CAREER DUMP TRUCK TRACTION INDUCTION MOTORS TECHNICAL CONDITION USING WAVELET ANALYSIS.....137

Andrey Borodin, Yuri Kiselev, Sergey Mirvoda and Sergey Porshnev

Ural Federal University Yekaterinburg, Russia

DEVELOPMENT OF DATA AGGREGATION CAPABILITIES IN DOMAIN-SPECIFIC QUERY LANGUAGE FOR METALLURGY.....141

A.V. Bubnov, A.N. Chudinov, V.A. Emashov

Omsk State Technical University, Omsk, Russia

TRACKING MODE IMPLEMENTATION FEATURES FOR THE SYNCHROPHASE ELECTRIC DRIVE.....147

A.V. Bubnov, A.V. Bubnova, M.V. Trokay, A.N. Chetverik

Omsk State Technical University, Omsk, Russia

MULTIFUNCTIONAL LOGICAL COMPARATOR FOR SYSTEMS WITH PHASE

SYNCHRONIZATION.....151

I.N. Burdinsky<sup>1,2</sup>, I.V. Karabanov<sup>1</sup>, A.S. Mironov<sup>1,2</sup>

<sup>1</sup>Pacific National University, Khabarovsk, Russia

<sup>2</sup>Institute for Marine Technology Problems of the Russian Academy of Sciences, Vladivostok, Russia HYDROACOUSTIC SIGNALS OF AUV DATA MEASURING SYSTEMS.....155

Alexandr I. Cheredov, Andrey V. Shchelkanov

Omsk State Technical University, Omsk, Russia

METROLOGICAL CHARACTERISTICS OF MEASURING CONVERTERS BASED ON OSCILLISTOR EFFECT.....160

E.U. Chye<sup>1</sup>, A.B. Shein<sup>2</sup>

<sup>1</sup>Pacific National University, Khabarovsk, Russia

<sup>2</sup>Chuvash State University, Cheboksary, Russia

DETERMINATION OF TRANSFER FUNCTION SELF-EXCITED INVERTERS FOR PROBLEMS AUTOMATIC CONTROL.....164

Tatyana Damdinova, Vera Radnaeva, Lubov Zhimbueva

East-Siberia State University of Technology and Management, Ulan-Ude, Russia

USING OF IMAGE PROCESSING TO STUDY IMPREGNATION PROCESS IN MATERIALS.....168

S.N. Danilin, S.A. Shchanikov

Murom Institute of Vladimir State University, Murom, Russia

THE RESEARCH OF OPERATION ACCURACY OF A MEMRISTOR-BASED ARTIFICIAL

NEURAL NETWORK WITH AN INPUT SIGNAL CONTAINING NOISE AND PULSE

INTERFERENCE.....171

V. V. Danshina, L.F. Kalistratova

Omsk State Technical University, Omsk, Russia

GAS ENVIRONMENT TYPE AND PRESSURE INFLUENCE ON THE SEMICONDUCTOR THIN FILMS ELECTRICAL PROPERTIES.....176

V.S. Deeva, E.V. Ivoylov, S.M. Slobodyan, A.F. Sekachev

Omsk State Technical University, Omsk, Russia

### MODELLING OF COIL BREAKDOWN AFFECTS THE ELECTROMAGNETIC CONTROL OF THE MOTION PLATFORM EQUIPPED WITH A LASER SYSTEM.....181

Liudmila Denisova<sup>1</sup>, Vitalii Meshcheryakov<sup>2</sup>

<sup>1</sup>Omsk State Technical University, Omsk, Russia

<sup>2</sup>Finance University under the Government of the Russian Federation, Omsk branch, Omsk, Russia COMPUTER-AIDED DESIGN OF THE FUZZY CONTROL SYSTEM USING THE GENETIC ALGORITHM.....185

Lilia U. Emaletdinova, Aigul N. Kabirova

Kazan National Research Technical University-KAI, Kazan, Russia

NEURAL FUZZY CONTROLLER TO CONTROL THE ANGLE OF HEEL AND THE COURSE OF THE UNMANNED AERIAL VEHICLE.....191

B.N. Epifantsev<sup>1</sup>, V.A. Komarov<sup>2</sup>

<sup>1</sup>The Siberian Automobile and Highway Academy Omsk, Russia

<sup>2</sup>Omsk State Transport University, Omsk, Russia

ADAPTING ACTIVE CONTROL SYSTEM TO CHANGES OF DETECTED SIGNALS SHAPES.....196

B.N. Epifantsev, S.A. Kopeykin

The Siberian Automobile and Highway Academy, Omsk, Russia

ON THE DETECTION PROBABILITY OF TERRORIST THREATS WITH THE MAIN PIPELINES PHYSICAL PROTECTION SYSTEMS.....200

Y.I. Eremenko, A.I. Glushchenko, V.A. Petrov

Stary Oskol Technological Institute n.a. A.A. Ugarov (branch) NUST "MIS&S", Stary Oskol, Russia ON NEURAL NETWORK BASED ONLINE TUNING OF ROLLING MILL DRIVE ARMATURE CURRENT PI-CONTROLLER PARAMETERS.....205

I.E. Eremin, M.M. Michailov, D.S. Scherban

Amur State University, Blagoveschensk, Russia

STRUCTURAL AND PARAMETRICAL SYNTHESIS OF CYBERNETIC MODEL OF ELASTIC IONIC POLARIZATION.....212

Eugenie L. Eremin<sup>1</sup>, Evgeniy A. Shelenok<sup>2</sup>

<sup>1</sup>Amur State University, Blagoveshchensk, Russia

<sup>2</sup>Pacific National University, Khabarovsk, Russia

COMBINED ADAPTIVE CONTROL SYSTEM FOR NONLINEAR OBJECT WITH DELAY AND SELF-TUNING DYNAMIC CORRECTION UNIT.....217

Ivan A. Ershov, Oleg Stukach

National Research Tomsk Polytechnic University, Tomsk, Russia

APPROACH TO THE CLUSTERING MODELING FOR THE STRONG CORRELATIVE CONTROL MEASUREMENTS FOR ESTIMATION OF PERCENT OF THE SUITABLE INTEGRATED CIRCUITS IN THE SEMICONDUCTOR INDUSTRY.....223

E.M. Fedorov, A.A. Koba

National Research Tomsk Polytechnic University, Tomsk, Russia

THREE-AXIS LASER METHOD FOR MEASURING THE DIAMETER OF CYLINDRICAL OBJECTS.....227

D. Frolov, K. Korotkov, A. Levchenko, A. Babenko, A. Gnoevoy

Kuban State University, Krasnodar, Russia

ANALYSIS OF METHODS FOR CHARACTERIZING FREQUENCY-CONVERTING DEVICES.....231

R.R. Gazizov, A.M. Zabolotsky, T.R. Gazizov

Tomsk State University of Control Systems and Radioelectronics, Tomsk, Russia ULTRASHORT PULSE MAXIMUM LOCALIZATION IN MULTICONDUCTOR STRUCTURES....235

Elena S. Gebel

Omsk State Technical University, Omsk, Russia

INVERSE DISPLACEMENT PROBLEM OF GOUGH -STEWART PLATFORM WITH SIX DEGREES OF FREEDOM.....240

S.S. Girshin, V.N. Goryunov, E.A. Kuznetsov, A.Ya. Bigun, E.V. Petrova, A.A. Bubenchikov Omsk State Technical University, Omsk, Russia

COMPARATIVE ANALYSIS OF INSULATION-COVERED AND BARE CONDUCTORS OF OVERHEAD LINES WITH VARIATION OF LOAD CURRENTS CONSIDERING WEATHER CONDITIONS.....244

S.S. Girshin, V.N. Goryunov, A.Ya. Bigun, E.V. Petrova, E.A. Kuznetsov

Omsk State Technical University, Omsk, Russia

OVERHEAD POWER LINE HEATING DYNAMIC PROCESSES CALCULATION BASED ON THE HEAT TRANSFER QUADRATIC MODEL.....250

A.V. Golunov, V.Yu. Kirnosov, A.S. Golunova, O.V. Trapeznikova, M.A. Fedorova

Omsk State Technical University, Omsk, Russia

AUTOMATED CONTROL AND INTERPRETATION OF COLOUR REPRODUCTION.....255

Igor Gontchar<sup>1</sup>, Maria Chushnyakova<sup>2</sup>

<sup>1</sup>Omsk State Transport University, Omsk, Russia

<sup>2</sup>Omsk State Technical University, Omsk, Russia

DYNAMICAL MODELING OF FISSION PROCESS: IMPACT OF THE COLLECTIVE POTENTIAL.....260

Evgeny Kostyuchenko , Dariya Ignatieva, Roman Mescheryakov, Alexander Pyatkov, Evgeny Choynzonov, Lidiya Balatskaya

<sup>1</sup>Laboratory of Biomedical Research, Tomsk State University of Control Systems and Radioelectronics, Tomsk, Russia

MODEL OF SYSTEM QUALITY ASSESSMENT PRONOUNCING PHONEMES.....264

A.A. Kalentyev, M.V. Cherkashin, D.V. Garays, L.I. Babak

Tomsk State University of Control Systems and Radioelectronics, Tomsk, Russia GENETIC-ALGORITHM-BASED AUTOMATED SYNTHESIS OF SIGE BICMOS 1-7 GHZ LINEAR

Andrey A. Kapelyuhovskiy

AMPLIFIER.....269

Omsk State Technical University, Omsk, Russia

### EXTREMAL SYSTEM FOR CONTROL THE INTENSITY OF THE ROTARY OSCILLATOR EMISSION....272

Igor Kashchenko

Omsk State Technical University, Omsk, Russia

A FAST WAY FOR APPROXIMATION OF NONLINEAR DISTORTION OF POWER AMPLIFIERS.....276

Alexey S. Katasev, Dina V. Kataseva

Kazan National Research Technical University named after A.N. Tupolev, Kazan, Russia NEURAL NETWORK DIAGNOSIS OF ANOMALOUS NETWORK ACTIVITY IN TELECOMMUNICATION SYSTEMS.....280

Marat S. Khairetdinov <sup>1,2</sup>, Valeriy V. Kovalevskiy<sup>2</sup>

Novosibirsk State Technical University, Novosibirsk, Russia

Institute of Computational Mathematics and Mathematical Geophysics, Novosibirsk, Russia NONLINEAR DYNAMICS OF SEISMIC VIBRATORS.....284

I.A. Kirovskaya, T.L. Bukashkina

Omsk State Technical University, Omsk, Russia

STRUCTURAL PROPERTIES - PRECURSORS OF ADSORPTIVE ACTIVITY OF CADMIUM CHALCOGENIDE NEW MATERIALS.....289

I.A. Kirovskaya, E.V. Mironova, A.A. Grigan, M.A. Zverev

Omsk State Technical University, Omsk, Russia

BULK AND SURFACE PROPERTIES OF NEW MATERIALS BASED ON  $A^{II}S$  SEMICONDUCTOR COMPOSITES.....293

I.A. Kirovskaya, P.E. Nor

Omsk State Technical University, Omsk, Russia

PREDICTING SURFACE PROPERTIES OF THE NOVEL MATERIALS CD  $(B^{VI})_X(B^{VI})_{1-X}BY$  THEIR BULK PHYSICOCHEMICAL PROPERTIES.....298

A.A. L'vov<sup>1</sup>, D.V. Klenov<sup>1</sup>, A.A. Sytnik<sup>1</sup>, O.N. Dolinina<sup>1</sup>, M.S. Svetlov<sup>2</sup>

<sup>1</sup>Yuri Gagarin State Technical University of Saratov, Saratov, Russia

<sup>2</sup>Institute of Precision Mechanics and Control of RAS, Saratov, Russia

INCREASING OF INFORMATION RELIABILITY OF DIGITAL COMMUNICATION CHANNELS UNDER CONDITIONS OF HIGH INTENSITY NOISE.....303

Yu. N. Klikushin<sup>1</sup>, K.T. Koshekov<sup>2</sup>, V. Yu. Kobenko<sup>1</sup>, O. M. Belosludtsev<sup>3</sup>, A.K. Koshekov

<sup>1</sup>Omsk State Technical University, Omsk, Russia

<sup>2</sup>The North-Kazakhstan State University n.a. M.Kozybayev, Petropavlovsk, Kazakhstan

<sup>3</sup>Institute of Seismology (IS), Almaty, Republic of Kazakhstan

Almaty University of Power Engineering and Telecommunications, Almaty, Republic of Kazakhstan

SEARCH OF OPERATIONAL EARTHQUAKE PRECURSOR ON THE BASIS OF

IDENTIFICATION MEASUREMENTS OF SEISMOGRAPHIC RECORDS.....309

Dmitry N. Klypin, Ilya V. Potapov, Dmitry A. Titov, Antonina A. Garaeva Omsk State Technical University, Omsk, Russia

#### THE BASE TASKS IN DEVELOPMENT OF BIOMEDICAL DATA INFORMATION SYSTEM.....313

Alexander A. Kolokolov, Lidia A. Zaozerskaya

Sobolev Institute of Mathematics, Siberian Branch, of the Russian Academy of Sciences, Omsk, Russia ANALYSIS OF SOME CUTTING PLANE ALGORITHMS OF INTEGER PROGRAMMING\*.....317

A.G. Koltsov, D.A. Blokhin, E.V. Krivonos, A.N. Narezhnev

Omsk State Technical University, Omsk, Russia

INFLUENCE ASSESSMENT OF METAL-CUTTING EQUIPMENT GEOMETRICAL ACCURACY ON OMV-TECHNOLOGIES ACCURACY.....322

S.G. Konesev, R.T. Khazieva, R.V. Kirillov

Ufa State Petroleum Technological University, Ufa, Russia

THE RESEARCH OF STABILIZATION PROPERTIES OF INDUCTIVE-CAPACITIVE

CONVERTERS BASED ON THE TWO-SECTIONS HYBRID ELECTROMAGNETIC ELEMENTS.....329

D.V.Korobatov, E.A.Sirotkin, A.O.Troickiy, E.V.Solomin

South Ural State University (National Research University), Chelyabinsk, Russia

WIND TURBINE POWER PLANT CONTROL.....336

A.G. Kozlov, E.A. Fadina

Omsk State Technical University, Omsk, Russia

ANALYSIS OF ELECTROPHYSICAL PROCESSES IN SYSTEM OF INTERDIGITATED MICROELECTRODES USED IN MICROCHANNELS.....340

Ye.M.Kuznetsov<sup>1</sup>, V.V.Anikin<sup>2</sup>

<sup>1</sup>Omsk State Technical University, Omsk, Russia

<sup>2</sup>Nizhnevartovsk State University, Nizhnevartovsk, Russia

DETERMINATION OF THE ELECTROMAGNETIC PARAMETERS OF SUBMERSIBLE ELECTRIC MOTORS OF ELECTRIC CENTRIFUGAL PUMPS INSTALLATIONS.....345

Ye.M.Kuznetsov<sup>1</sup>, V.V.Anikin<sup>2</sup>

<sup>1</sup>Omsk State Technical University, Omsk, Russia

<sup>2</sup>Nizhnevartovsk State University, Nizhnevartovsk, Russia

DETERMINING COMPUTATIONAL ASPECTS OF SUBMERSIBLE ELECTRIC CENTRIFUGAL PUMP INSTALLATIONS ELECTRIC MOTORS PARAMETERS.....349

Yu.V. Kuznetsova, Vad. I. Surikov, Val. I. Surikov, O.V. Lyah, N. A. Semenyuk

Omsk State Technical University, Omsk, Russia

CHANGING THE PROPERTIES OF DOPED VANADIUM DIOXIDE DURING PROLONGED STORAGE UNDER NATURAL CONDITIONS.....354

I.S. Latypov, V.V. Sushkov

Tyumen Industrial University, Tyumen, Russia

REDUCTION OF ACTIVE POWER LOSSES IN OVERHEAD POWER TRANSMISSION LINES RATED FOR 6-35 KV.....357

Pavel Lozhnikov <sup>1</sup>, Alexey Sulavko<sup>1</sup>, Alexander Eremenko<sup>2</sup>, Danil Volkov <sup>1</sup>

<sup>1</sup>Omsk State Technical University, Omsk, Russia

<sup>2</sup>Omsk State Transport University, Omsk, Russia

METHOD OF PROTECTING PAPER AND ELECTRONIC TEXT DOCUMENTS THROUGH A HIDDEN BIOMETRIC IDENTIFIER BASED ON A SIGNATURE.....360

Pavel Lozhnikov <sup>1</sup>, Alexey Sulavko <sup>1</sup>, Ekaterina Buraya <sup>2</sup>, Alexander Eremenko <sup>3</sup>

<sup>1</sup>Omsk State Technical University, Omsk, Russia

<sup>2</sup>USATU, Ufa, Russia

<sup>3</sup>Omsk State Transport University, Omsk, Russia

METHODS OF GENERATING KEY SEQUENCES BASED ON KEYSTROKE DYNAMICS.....365

A.A. L'vov<sup>1</sup>, P.A. L'vov<sup>2</sup>, R.S. Konovalov<sup>2</sup>, S.A. Kuzin<sup>2</sup>

<sup>1</sup>Yuri Gagarin State Technical University of Saratov, Saratov, Russia

OJSC "Signal" Engels Design Bureau named after A.I. Glukharev, Engels, Saratov region, Russia THE USE OF CURRENT LOOP CIRCUIT AS A SIGNAL CONDITIONER FOR HIGH ACCURACY DIGITAL PIEZORESISTIVE PRESSURE SENSORS.....370

Oleg A. Lysenko

Omsk State Technical University, Omsk, Russia

THE RESEARCH OF AXEL-BOX 24-POLE GENERATORS FOR COMMUNICATIONS SYSTEMS OF FREIGHT RAILWAY WAGONS.....375

V.V. Lyubimov, S.V. Podkletnova

Samara University, Samara, Russia

MODELING OF OPTIMAL REDUCTION OF SMALL ANGULAR VELOCITY OF THE MICROSATELLITE USING ONBOARD MAGNETIC COILS.....379

Alexander G. Lyutarevich, Dmitry S. Osipov, Stanislav Y. Dolinger, Alexander A. Plankov

Omsk State Technical University, Omsk, Russia

DEVELOPMENT OF ROTOR POSITION SENSOR FOR A PERMANENT MAGNET MOTOR.....384

E.A. Maklakova, V.R. Gasiyarov

South Ural State University, Chelyabinsk, Russia

IMPACT LOAD RESEARCHES FOR DIFFERENT SETTINGS OF CURRENT REGULATION LOOP OF ELECTRIC DRIVE CONTROL SYSTEM OF ROLLING STAND.....388

Gennady V. Malgin<sup>1</sup>, Anton V. Veynblat<sup>2</sup>

<sup>1</sup>Nizhnevartovsk State University, Nizhnevartovsk, Russia

<sup>2</sup>JSC Zarubezhneft, Moscow, Russia

USING THE POTENTIAL OF ENERGY AND RESOURCE CONSERVATION IN OIL FIELD POWER SUPPLY NETWORKS.....392

Nadezhda N. Malysheva, Aleksandr A. Pavlov

Nizhnevartovsk State University, Nizhnevartovsk, Russia

DETERMINATION OF PROBABILISTIC DESCRIPTIONS AND STOCHASTIC PROCESSES OF CHANGES LOADS.....396

Anton S. Martianov<sup>1</sup>, Valerii V. Sushkov<sup>2</sup>

<sup>1</sup>Tyumen Industrial University, Tyumen, Russia

<sup>2</sup>Nizhnevartovsk State University, Nizhnevartovsk, Russia RIDE-THROUGH SOLUTIONS: CLASSIFICATION AND COMPARISON.....401

Yu.K. Mashkov<sup>1</sup>, A.S.Ruban<sup>2</sup>

<sup>1</sup>Omsk State Technical University, Omsk, Russia

<sup>2</sup>Siberian State Automobile and Highway Academy, Omsk, Russia

THERMODYNAMICS OF STRESS-STRAIN AND THERMAL STATE OF THE

METALLOPOLYMER TRIBOSYSTEMS ELEMENTS....405

Vitalii Meshcheryakov<sup>1</sup>, Igor Denisov<sup>2</sup>

<sup>1</sup>Omsk State Transport University, Omsk, Russia

<sup>2</sup>Siberian State Automobile and Road Academy, Omsk, Russia

AUTOMATION OF THE JIB CRANE OPERATIONS USING ADAPTIVE NEURO-FUZZY INFERENCE SYSTEM.....409

A.G. Mikhailov, P.A. Batrakov

Omsk State Technical University, Omsk, Russia

EXPERIMENTAL STUDY OF THE RADIATIVE-CONVECTIVE HEAT TRANSFER IN COMPLEX SHAPE FURNANCES OF THE GAS-TUBE BOILER.....413

Lev I. Mogilevich, Victor S. Popov

Yuri Gagarin State Technical University of Saratov, Saratov, Russia

MATHEMATICAL MODELING OF INCOMPRESSIBLE VISCOUS LIQUID LAYER

INTERACTION DYNAMICS IN AN ANNULAR SLIT WITH ITS WALL, SURROUNDED BY ELASTIC MEDIUM.....417

Lev I. Mogilevich<sup>1</sup>, Anna A. Popova<sup>1</sup>, Victor S. Popov<sup>1</sup>, Aleftina V. Christoforova<sup>2</sup>

<sup>1</sup>Yuri Gagarin State Technical University of Saratov, Saratov, Russia

<sup>2</sup>National Research Saratov State University, Saratov, Russia

MATHEMATICAL MODELING OF HIGHLY VISCOUS LIQUID DYNAMIC INTERACTION WITH WALLS OF CHANNEL ON ELASTIC FOUNDATION.....421

M.U. Nikolayev, E.V. Nikolayeva, A.A. Lyashkov

Omsk State Technical University, Omsk, Russia

DATA MEASURING CHANNELS CALIBRATION PROCEDURE.....425

A.V. Nikonov, G.V. Nikonova

Omsk State Technical University, Omsk, Russia

FUNCTIONAL AND CIRCUITRY BASE OF CONTROL EQUIPMENT DESIGNED FOR TESTING LARGE-SCALE INTEGRATED CIRCUITS.....429

Mariya N. Odinets, Natalya V. Kaygorodtseva, Alexandr I. Odinets, Tatyana N. Kaygorodtseva

Omsk State Technical University, Omsk, Russia

COMPUTER MODELLING OF A COLLAPSIBLE SURFACE OF THE MIRROR OF THE

PARABOLIC ANTENNA, WHILE MAINTAINING THE TECHNICAL CHARACTERISTICS.....433

Y.Y. Ogorodnikov

Omsk State Technical University, Omsk, Russia

A COMBINED ATTACK ON RSA ALGORITHM BY SAT-APPROACH\*.....438

Pavel P. Oleynik

Shakhty Institute (branch) of Platov South Russian State Polytechnic University, Rostov-on-Don, Russia ROLE-BASED ACCESS CONTROL MODEL AS APPLIED TO OBJECT-ORIENTED APPLICATIONS.....444

Pavel P. Oleynik<sup>1</sup>, Vasyliy I. Gurianov<sup>2</sup>

<sup>1</sup>Shakhty Institute (branch) of Platov South Russian State Polytechnic University, Rostov-on-Don, Russia <sup>2</sup>Saint-Petersburg State Economic University (branch), Cheboksary, Russia

USER UML-PROFILE AND METAMODEL-DRIVEN DESIGN OF DATABASE APPLICATIONS.....450

Vladimir Y. Olhovskiy, Marina A. Klepche, Tatyana V. Myateg

Novosibirsk State Technical University, Novosibirsk, Russia

THE INFLUENCE OF HIGH HARMONICS GENERATION OF LOW POWER CONSUMERS ON UP TO 1000 V NETWORKS OPERATION.....456

Dmitry S. Osipov, Nadezda N. Dolgikh, Vladimir N. Goryunov, Dmitry V. Kovalenko Omsk State Technical University, Omsk, Russia

ALGORITHMS OF PACKET WAVELET TRANSFORM FOR POWER DETERMINATION UNDER NONSINUSOIDAL MODES.....463

S.O. Podgornyi, .T. Podgornaya, E.D. Skutin, I.P. Demeshko, O.V. Lukoyanova, K.I. Fedotova Omsk State Technical University, Omsk, Russia CADMIUM TELLURIDE NANOFILMS APPLICATION IN CARBON MONOXIDE DETECTION.....468

S. Porshnev, D. Kusaykin

Ural Federal University, Yekaterinburg, Russia

ON FEATURES OF DISCRETE SIGNAL RECONSTRUCTION REGISTERED AT THE 8 PARALLEL 5-BIT ADC SYSTEM OUTPUT.....472

S.V. Porshnev, D.A. Bozhalkin

Ural federal university named after the first President of Russia B. N. Yeltsin, Ekaterinburg, Russia THE STUDY OF SELF-SIMILARITY OF THE TRAFFIC TRANSMITTED IN THE BACKBONE INTERNET CHANNEL.....478

V.I. Potapov, A.S. Gritsay, D.A. Tyunkov

Omsk State Technical University, Omsk, Russia

SPECTRAL ANALYSIS OF RETROSPECTIVE DATA ON POWER CONSUMPTION.....485

F.N. Pritykin, V. I. Nebritov

Omsk State Technical University, Omsk, Russia

STUDYING TOLERANCE RANGE OF GENERALIZED VELOCITIES VECTOR UNDER ANDROID MOTION SYNTHESIS.....489

F.N. Pritykin, D.I. Nefedov

Omsk State Technical University, Omsk, Russia

COMPUTATION OF MANIPULATOR MECHANISM PATH IN JOINT COORDINATE SPACE WITH WORKING RANGE FORBIDDEN REGIONS.....493

Nikolai E. Proskuriakov, Boris S. Yakovlev

Polytechnic institute, Tula State University, Tula, Russia THE IMPROVING OF THE EFFECTIVENESS OF THE TECHNOLOGY OF VERIFICATION OF WEBSITES IN THE INTERNET.....497

Alexander Pugachev

Bryansk State Technical University, Bryansk, Russia

INVESTIGATION OF THE DYNAMICS OF ELECTRIC DRIVE IN FAULT MODES OF TWO- AND THREE-LEVEL INVERTERS 502

E.V. Pugin1, A.L. Zhiznyakov

Vladimir State University named after Alexander and Nikolay Stoletovs, Murom, Russia FILTERING OF MEANINGFUL FEATURES OF FUZZY HOUGH TRANSFORM.....507

M.Yu. Pustovetov

Rostov State Transport University, Rostov-on-Don, Russia

A MATHEMATICAL MODEL OF THE THREE-PHASE INDUCTION MOTOR IN THREE-PHASE STATOR REFERENCE FRAME DESCRIBING ELECTROMAGNETIC AND ELECTROMECHANICAL PROCESSES.....512

Nikolay A. Raykovskiy, Sergey A. Abramov, Dmitriy B. Ponomarev, Alexander G. Zyrin Omsk State Technical University, Omsk, Russia A METHOD OF MEASURING FRICTION SURFACE TEMPERATURE OF THE ROTATING ROTOR.....516

Alexey Rodionov

Institute of Computational Mathematics and Mathematical Geophysics, Novosibirsk, Russia Novosibirsk State Technical University, Novosibirsk, Russia CUMULATIVE ESTIMATED VALUES OF STRUCTURAL NETWORK'S RELIABILITY INDICES AND THEIR USAGE.....520

S.V. Rodygina, A.V. Rodygin

Novosibirsk State Technical University, Novosibirsk, Russia COMPARATIVE ANALYSIS OF ELECTRICAL LOAD FORECASTING MODELS OF INDUSTRIAL PLANTS.....524

Ilya Rostokin, Elena Fedoseeva

Murom Institute of Vladimir State University, Murom, Russia

DATA ACQUISITION AND PROCESSING SYSTEM MULTIFREQUENCY MICROWAVE RADIOMETRY CONTROL STATE METEOROLOGICAL FORMATIONS WITH COMPENSATION OF BACKGROUND NOISE.....528

Mikhail E. Rovkin<sup>1</sup>, Valery A. Khlusov<sup>1</sup>, Alexey V. Hristenko<sup>1</sup>, Mikhail V.Osipov<sup>1</sup>, Oleg Yu. Swarovsky<sup>2</sup> TUCSR, Tomsk, Russia

<sup>2</sup>Joint-stock company "Scientific and Production firm "Micran", Tomsk, Russia INCREASING OF DYNAMIC RANGE OF THE HOMODYNE RECEIVING MICROWAVE CHANNEL OF FM-CW RADAR.....535

Alexander N. Rybalov

Omsk State Technical University, Omsk, Russia

ON THE P VS NP PROBLEM OVER REALS WITH INTEGER ORACLE\*.....540

N.T. Safiullin, S.V. Porshnev

Ural Federal University, Yekaterinburg, Russia

THE EVALUATION OF A NEW MODEL OF SUN ACTIVITY WITH DATA ASSIMILATION TECHNIQUE.....544

A.S. Salnikov, A.A. Kokolov, F.I. Scheyerman, R.Yu. Musenov, I.M. Dobush, L.I. Babak Tomsk State University of Control Systems and Radioelectronics, Tomsk, Russia INTEGRATED BALUN DESIGN FOR SIGE SYSTEM-ON-A-CHIP.....548

S.V. Saveliev

The Siberian automobile and highway academy, Omsk, Russia

MODELING OF DYNAMIC DEFORMATION OF SOIL MEDIA BY VIBRATORY ROLLERS IN CONSTRUCTION OF TRANSPORT OBJECTS.....551

V.V. Sazonov, M.A. Shcherbakov, V.A. Vasiliev

Penza State University, Penza, Russia

NONLINEAR SVD-FILTERING OF DIGITAL IMAGES IN INFOCOMMUNICATION SYSTEMS.....555

S.V. Semenikhin, L.A. Denisova

Omsk State Technical University, Omsk, Russia

LEARNING TO RANK BASED ON MODIFIED GENETIC ALGORITHM.....559

Andriy Semenov

Vinnytsia National Technical University, Vinnytsia, Ukraine

DETERMINISTIC CHAOS OSCILLATOR BASED ON A BIPOLAR AND FIELD-EFFECT

TRANSISTOR STRUCTURE WITH NEGATIVE RESISTANCE.....564

Irina Semenova, Yuri Monakhov, Mikhail Monakhov

Vladimir State University named after Alexander and Nikolay Stoletovs, Vladimir, Russia RESEARCH OF THE DEPENDENCIES IN VARIABILITY OF DATA RELIABILITY INDICATORS IN INFORMATION AND TELECOMMUNICATION SYSTEMS.....568

M.A. Shcherbakov, V.V. Sazonov

Penza State University, Penza, Russia

SVD-SCALING OF DIGITAL IMAGES IN THE INFORMATION AND COMMUNICATION SYSTEMS.....575

V.B. Shirokov<sup>1'2</sup>, V.V. Kalinchuck<sup>1</sup>, P.E. Timoshenko<sup>1</sup>, P.E. Timoshenko<sup>2</sup>, Yu.I. Yuzyuk<sup>2</sup>

Southern Scientific Center of Russian Academy of Sciences, Rostov-on-Don, Russia

<sup>2</sup>Southern Federal University, Rostov-on-Don, Russia

ACOUSTIC PROPERTIES OF BST08 FILMS TUNABLE BY BIAS ELECTRIC FIELD.....579

Alexey Shokarev, Evgeny Kostyuchenko

Yurga Institute of Technology, Yurga, Russia

TUSUR, Tomsk, Russia

USER AUTHORIZATION IN THE PICTURE PASSWORD SYSTEM WITH APPLICATION OF DIGITAL WATERMARKS .....583

E.G. Shubenkova, Y.R. Veprikova

Omsk State Technical University, Omsk, Russia

STRUCTURAL AND ELECTRONIC PROPERTIES OF CADMIUM SULFIDE NANOPARTICLES SYNTHESIZED IN INVERSE EMULSION AOT.....588

O.A. Sidorov<sup>1</sup>, V.N. Goryunov<sup>2</sup>, I.L. Salya<sup>1</sup>, V.V. Tomilov<sup>1</sup>

<sup>1</sup>Omsk State Transport University, Omsk, Russia

<sup>2</sup>Omsk State Technical University, Omsk, Russia

DYNAMIC MODELS CHOICE FOR PANTOGRAPHS OF HIGH-SPEED RAILWAY TRANSPORT.....591

V.I. Strunin, L.V. Baranova, G.Zh. Khudaibergenov

Omsk State University F.M. Dostoyevsky, Omsk, Russia

STUDY ON INFLUENCE OF METASTABLE STATE OF HELIUM ON ATOMIC SILICON CONCENTRATION.....595

Ilya S. Sukhachev<sup>1</sup>, Tatyana D. Gladkikh<sup>1</sup>, Valery V. Sushkov<sup>2</sup>

<sup>1</sup>Tyumen Industrial University, Tyumen, Russia

<sup>2</sup>Nizhnevartovsk State University, Nizhnevartovsk, Russia

AN ALGORITHM OF THE LOSS RISK ASSESSMENT IN THE OIL PRODUCTION IN CASE OF ELECTRIC SUBMERSIBLE MOTOR FAILURE.....599

Ilya S. Sukhachev<sup>1</sup>, Valery V. Sushkov<sup>2</sup>

<sup>1</sup>Tyumen Industrial University, Tyumen, Russia

<sup>2</sup>Nizhnevartovsk State University, Nizhnevartovsk, Russia

ASSESSMENT DYNAMICS OF RELIABILITY AND RESOURCE CONSUMPTION OF "CABLE — SUBMERSIBLE ELECTRIC MOTOR" SYSTEM AT WEST SIBERIA OIL FIELDS.....603

Yury V. Surovikin, Anna V. Syrieva, Alexander G. Shaitanov

Institute of Hydrocarbons Processing of Siberian Branch of the Russian Academy of Sciences, Omsk, Russia

THE STUDY OF MODIFIED CARBON BLACK BY RAMAN SPECTROSCOPY METHOD ..... 607

Yury V. Surovikin, Anna V. Syrieva, Vladimir A. Likholobov

Institute of Hydrocarbons Processing of Siberian Branch of the Russian Academy of Sciences, Omsk, Russia

PROPERTIES OF THE GRANULAR NANOCOMPOSITE PYROCARBON MATRIX.....612

R.S. Surovtsev, A.V. Nosov, A.M. Zabolotsky, T.R. Gazizov

Tomsk State University of Control Systems and Radioelectronics, Tomsk, Russian Federation PROTECTION AGAINST ULTRASHORT PULSES BASED ON A TURN OF MEANDER MICROSTRIP LINE.....618

Andrey A. Tatevosyan

Omsk State Technical University, Omsk, Russia

THE CALCULATION OF THE MAGNETIC FIELD OF THE SYNCHRONOUS

MAGNETOELECTRIC GENERATOR.....623

A.V. Terekhin

Murom Institute of Vladimir State University, Murom, Russia

CLASSIFICATION MODEL FOR FLAT NONCONVEX IMAGES USING DIAGONAL SEGMENTS AND TUPLES FOR SYSTEM OF AUTOMATIC RECOGNITION OF THREE-DIMENSIONAL OBJECTS.....627

A.V. Terekhin

Murom Institute of Vladimir State University, Murom, Russia DEVELOPMENT OF INVARIANT FEATURES OF NONCONVEX IMAGES FOR SYSTEM OF AUTOMATIC RECOGNITION OF THREE-DIMENSIONAL OBJECTS.....631

A.V. Tignibidin, V.N. Ivanov

Omsk State Technical University, Omsk, Russia

SUBSTANTIATION OF APPLICATION OF THE DEVELOPED DEVICE FOR MEASUREMENT OF GEOMETRICAL CHARACTERISTICS OF PARTS IN THE COURSE OF PROCESSING ON GRINDING OPERATIONS.....635

S. Trofimov, O. Ponomareva

Ural Federal University, Yekaterinburg, Russia

DATA FORMALIZATION BY ALGEBRA OF SETS IN MULTI-DIMENSION SPACE.....642

V.G. Tsyss, I.M. Strokov, M.Yu. Sergaeva

Omsk State Technical University, Omsk, Russia

FLEXIBLE COUPLING DYNAMIC ANALYSIS AS A SHIP SHAFTING PART.....645

M.T. Tukhtasinov, N. Mirzaev, O.M. Narzulloev

Tashkent University of Information Technologies, Tashkent, Republic of Uzbekistan FACE RECOGNITION ON THE BASE OF LOCAL DIRECTIONAL PATTERNS.....650

Sergey N. Udalov, Andrey A. Achitaev, Alexander G. Pristup

Novosibirsk State Technical University, Novosibirsk, Russia

IMPROVING DYNAMIC STABILITY OF A WIND TURBINE USING A MAGNETIC CONTINUOUSLY VARIABLE TRANSMISSION.....655

Alexander N. Varnavsky, Nadezhda V. Sinitsina

Ryazan State Radio Engineering University, Ryazan, Russi

SIMULATION OF CAR COLLISION WHILE OVERTAKING WITH MOVING INTO THE ONCOMING LANE.....659

Alexander N. Varnavsky, Vladimir M. Zhuravlev

Ryazan State Radio Engineering University, Ryazan, Russia

SIMULATION OF TIMELY WARNING OF A DRIVER ABOUT COLLISION WITH ONCOMING VEHICLES USING A CAR DVR.....663

V.A. Vasil'ev, N.V. Gromkov, A.J. Joao

Penza State University, Penza, Russia

THE STRUCTURE OF THE UNIVERSAL MICROMODULE OF THE INTEGRATING SCANNING FREQUENCY CONVERTER.....668

Vladimir I. Vasilyev<sup>1</sup>, Alexander V. Eremenko<sup>2</sup>, Alexey E. Sulavko<sup>3</sup>, Samal S. Zhumazhanova<sup>3</sup> <sup>1</sup>USATU, Ufa, Russia

<sup>2</sup>Omsk State Transport University, Omsk, Russia

<sup>3</sup>Omsk State Technical University, Omsk, Russia

IDENTIFICATION POTENTIAL CAPACITY OF TYPICAL HARDWARE FOR THE PURPOSE OF HIDDEN RECOGNITION OF COMPUTER NETWORK USERS.....672

Sergey Voytenkov, Evgeniy Vitvitskiy

Siberian State Automobile and Highway Academy, Omsk, Russia

MANAGEMENT OF URBAN FREIGHT TRANSPORT SYSTEM: STATE AND PROSPECTS.....677

M.Z. Yakubova<sup>1</sup>, T. G. Serikov<sup>1</sup>, A.D. Mekhtiyev<sup>1</sup>, Y.G.Neshina<sup>1</sup>, A.D. Alkina<sup>2</sup>, A.V. Yurchenko<sup>2</sup>

<sup>1</sup>Karaganda State Technical University, Karaganda, Kazakhstan

<sup>2</sup>Tomsk Polytechnic University, Tomsk, Russia

DEVELOPMENT AND IMITATING MODELING IN THE DEVELOPED NETWORK CONSISTING OF SEVERAL KNOTS REMOVED AMONG THEMSELVES ON NETCRACKER 4.1.....683

Gennady Zabudsky, Natalia Veremchuk

Sobolev Institute of Mathematics of the Siberian Branch of the Russian Academy of Sciences, Omsk, Russia

WEBER PROBLEM FOR RECTANGLES ON LINES WITH FORBIDDEN GAPS.....687

V.N. Zadorozhnyi

Omsk State Technical University, Omsk, Russia

DYNAMICS EQUATIONS OF END ARC DEGREES IN GROWING GRAPHS.....692

V.N. Zadorozhnyi<sup>1</sup>, E.B. Yudin<sup>2</sup>

<sup>1</sup>Omsk State Technical University, Omsk, Russia

<sup>2</sup>Sobolev Institute of Mathematics, Siberian Branch of the Russian Academy of Sciences Omsk, Russia

DYNAMIC EQUATIONS OF NODE DEGREES IN GROWING NETWORKS WITH CONNECTION LOSSES.....698

V.N. Zadorozhnyi, T.R. Zakharenkova

Omsk State Technical University, Omsk, Russia

OPTIMIZATION OF CHANNEL DISTRIBUTION OVER NODES IN NETWORKS WITH FRACTAL TRAFFIC.....703

Oleg V. Zakharov<sup>1</sup>, Nikolaj M. Bobrovskij<sup>2</sup>, Andrei V. Kochetkov<sup>3</sup>, Igor N. Bobrovskij<sup>2</sup>, Andrey A. Korolev<sup>4</sup>, Vladimir A. Ivashchenko<sup>5</sup>

<sup>1</sup>Samara university, Samara, Russia

<sup>2</sup>Togliatti State University, Togliatti, Russia

<sup>3</sup>Perm National Research Polytechnic University, Perm, Russia

<sup>4</sup>Yuri Gagarin State Technical University, Saratov, Russia

<sup>5</sup>Laboratory of system issues management and automation in mechanical engineering Institute of Precision Mechanics and Control of RAS, Saratov, Russia

OPTIMAL CONTROL METHOD FOR THE SPHERICITY ERROR USING CMMS.....710

P.V. Zakharov<sup>1</sup>, M.D. Starostenkov<sup>2</sup>, A.M. Eremin<sup>3</sup>, E.A. Korznikova<sup>4</sup>, S.V. Dmitiriev<sup>4</sup>, I.S. Lucenko<sup>5</sup>

<sup>1</sup>The Shukshin Altai State Humanities Pedagogical University, Biysk, Russia

<sup>2</sup>Altai State Technical University I.I. Polzunova, Barnaul, Russia

<sup>3</sup>The Shukshin Altai State Humanities Pedagogical University, Biysk, Russia <sup>4</sup>Institute for Metals Superplasticity Problems of Russian Academy of Sciences, Ufa, Russia <sup>5</sup>The Shukshin Altai State Humanities Pedagogical University, Biysk, Russia, INFLUENCE OF ELASTIC STRAIN ON THE POSSIBILITY OF EXCITATION OF DISCRETE BREATHERS IN THE NANOFIBER CRYSTAL WITH A<sub>3</sub>B STOICHIOMETRY.....713

#### E.V. Zaytseva

Tomsk state university of control system and radio electronics, Tomsk, Russia INTEGRAL AND SPECTRAL SENSITIVITY ASSESSMENT OF THE ACTIVE-PULSE TELEVISION SYSTEMS.....718

#### E.A. Zhiganova

Murom Institute «Vladimir State University named after Alexander and Nicholas Stoletovs», Murom, Russia

DEVELOPMENT OF A MATHEMATICAL MODEL FREQUENCY DETECTION SIGNALS PASSING THROUGH THE NONLINEAR DEVICE.....722

Natalia V. Zubova, Sergey N. Udalov, Vadim Z. Manusov Novosibirsk state technical university, Power Supply Systems Department, Novosibirsk, Russia PRIORITY ANALYSIS FOR CONTROL LOOPS OF A WIND TURBINE.....725

Vladimir Zykin

Omsk State Technical University, Omsk, Russia AUTOMATIZATION OF FOREIGN KEYS CONSTRUCTION.....729