

3rd International Conference on Information Technology and Nanotechnology (ITNT-2017)

Procedia Engineering Volume 201

Samara, Russia
25 – 27 April 2017

Editors:

**Victor Soifer
Nikolay Kazanskiy**

**Olga Korotkova
Sergei Sazhin**

ISBN: 978-1-5108-4888-7

Printed from e-media with permission by:

Curran Associates, Inc.
57 Morehouse Lane
Red Hook, NY 12571



Some format issues inherent in the e-media version may also appear in this print version.

Copyright© by Elsevier B.V.
All rights reserved.

Printed by Curran Associates, Inc. (2017)

For permission requests, please contact Elsevier B.V.
at the address below.

Elsevier B.V.
Radarweg 29
Amsterdam 1043 NX
The Netherlands

Phone: +31 20 485 3911
Fax: +31 20 485 2457

<http://www.elsevierpublishingsolutions.com/contact.asp>

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
Email: curran@proceedings.com
Web: www.proceedings.com

TABLE OF CONTENTS

PREFACE	1
<i>N/A</i>	
PHASE GRATING PATTERNING BY DIRECT LASER RECORDING ON AS₂S₃-SE NANOMULTILAYERS	2
<i>E. Achimova, V. Abaskin, A. Meshalkin, A. Prisacar, G. Triduh</i>	
AN INFLUENCE OF PERIOD STRUCTURE OF BINARY PHASE DIFFRACTIVE AXICON ON AN AMPLITUDE DISTRIBUTION IN FOCAL PLANE	7
<i>A. V. Ustinov</i>	
STUDY OF TERAHERTZ SPOOF SURFACE PLASMONS ON SUBWAVELENGTH GRATINGS WITH DIELECTRIC SUBSTANCE IN GROOVES	14
<i>V. V. Bulgakova, V. V. Gerasimov, B. G. Goldenberg, A. G. Lemzyakov, A. M. Malkin</i>	
AN ASYMPTOTIC METHOD FOR SOLVING PROBLEMS OF DIFFRACTION BY DIFFRACTIVE OPTICAL ELEMENTS WITH ZONE STRUCTURE	24
<i>S. I. Kharitonov</i>	
FOCUSING OF LASER LIGHT BY CIRCULAR MICROCYLINDERS WITH A METAL SHELL	36
<i>E. S. Kozlova, V. V. Kotlyar</i>	
GENERATION OF INTERFERENCE PATTERNS OF EVANESCENT ELECTROMAGNETIC WAVES AT FABRY-PEROT RESONANCES OF 1D PHOTONIC CRYSTAL MODES	42
<i>E. A. Kadomina, E. A. Bezus, L. L. Doskolovich</i>	
EFFECT OF LASER RADIATION POWER ON LASER TRAPPING OF LIGHT-ABSORBING MICROPARTICLES IN AIR	48
<i>A. P. Porfirev, S. A. Fomchenkov</i>	
DEFINED DISTRIBUTION FORMING IN THE NEAR DIFFRACTION ZONE BASED ON EXPANSION OF FINITE PROPAGATION OPERATOR EIGENFUNCTIONS	53
<i>S. N. Khonina, M. S. Kirilenko, S. G. Volotovskiy</i>	
THE STUDY OF THE BASIC OPERATING PARAMETERS OF A HYPERSPECTROMETER BASED ON THE OFFNER SCHEME	61
<i>Yu. S. Strelkov, S. I. Kharitonov</i>	
DIFFRACTION OF A GAUSSIAN BEAM ON A GRADIENT LENS WITH A FRACTIONAL DEGREE OF DEPENDENCE ON THE RADIUS	69
<i>Dmitry Savelyev</i>	
COLOR CORRECTION WITH 3D LOOKUP TABLES IN DIFFRACTIVE OPTICAL IMAGING SYSTEMS	73
<i>M. Petrov, S. Bibikov, Y. Yuzifovich, R. Skidanov, A. Nikonorov</i>	
TIGHT FOCUSING OF AZIMUTHALLY POLARIZED OPTICAL VORTEX PRODUCED BY SUBWAVELENGTH GRATING	83
<i>S. S. Stafeev, A. G. Nalimov, M. V. Kotlyar, L. O'Faolain, V. V. Kotlyar</i>	
DESIGN PECULIARITIES OF LIGHT-EMITTING DIODE DEVICES	90
<i>S. R. Abulkhanov, D. S. Goryainov</i>	
OPTICALLY EXCITED THZ GENERATION FROM ORDERED ARRAYS OF GAAS NANOWIRES	100
<i>V. N. Trukhin, A. D. Bouravleuv, I. A. Mustafin, J. P. Kakko, H. Lipsanen</i>	
DESIGN OF SILICA OPTICAL FIBERS WITH ENLARGED CORE DIAMETER FOR A FEW-MODE FIBER OPTIC LINKS OF ONBOARD AND INDUSTRIAL MULTI-GIGABIT NETWORKS	105
<i>A. E. Zhukov, V. A. Burdin, A. V. Bourdine</i>	
DESIGN OF PRECISION SPATIAL POSITIONING SCHEME FOR MODE DIVISION MULTIPLEXING SYSTEM CHANNELS PLACEMENT OVER OPTICAL FIBER CORE END	117
<i>A. V. Bourdine</i>	
IMAGING HYPERSPECTROMETER-CONSOL	129
<i>V. A. Blank, R. V. Skidanov</i>	
VORTEX AXICONS FOR HYPERGEOMETRIC BEAMS FORMATION	135
<i>S. V. Ganchevskaya, R. V. Skidanov</i>	
OPTICAL DIAGNOSTICS OF MALIGNANT AND BENIGN SKIN NEOPLASMS	141
<i>Yu. A. Khristorova, I. A. Bratchenko, D. N. Artemyev, O. O. Myakinin, A. A. Moryatov, O. I. Kaganov, S. V. Kozlov, V. P. Zakharov</i>	

INFLUENCE OF THE LINEAR MODE COUPLING ON THE NONLINEAR IMPAIRMENTS IN FEW-MODE FIBERS	148
<i>R. V. Kutluyarov, V. S. Lyubopytov, V. Kh. Bagmanov, A. Kh. Sultanov</i>	
DIGITAL SPECKLE PHOTOGRAPHY WITH THE RING APERTURE DIAPHRAGM	155
<i>M. N. Osipov, R. N. Sergeev</i>	
LASER BEAM SHAPING FOR MODIFICATION OF MATERIALS WITH FERRITIC-MARTENSITIC STRUCTURE	164
<i>S. P. Murzin, N. L. Kazanskiy, G. Liedl, A. Otto, R. Bielak</i>	
FOR THE JUBILEE OF PROFESSOR VICTOR V. KOTLYAR	169
<i>E. I. Kolomiets</i>	
THE MAKER OF HARMONIC LENS MICRORELIEFS	177
<i>V. O. Sokolov</i>	
CURVE FITTING OF MODIS NDVI TIME SERIES IN THE TASK OF EARLY CROPS IDENTIFICATION BY SATELLITE IMAGES	184
<i>Natalya Vorobiova, Andrey Chernov</i>	
MINIMIZING THE ENTROPY OF QUANTIZED POST-INTERPOLATION RESIDUALS FOR HIERARCHICAL IMAGE COMPRESSION	196
<i>M. V. Gashnikov</i>	
IDENTIFICATION OF SQUARE-EXPONENTIAL FIR-FILTER PARAMETERS IN THE ABSENCE OF A TEST IMAGE	206
<i>V. A. Fursov</i>	
SUPERVISED MULTICHANNEL IMAGE CLASSIFICATION ALGORITHM USING HIERARCHICAL HISTOGRAM REPRESENTATION	213
<i>A. Y. Denisova, V. V. Sergeev</i>	
TWO-SCALE IMAGE ANALYSIS IN THE IMAGE SMOOTHING PROBLEM	223
<i>P. A. Chochia</i>	
A REVIEW OF FOOD SECURITY AND FLOOD RISK DYNAMICS IN CENTRAL DRY ZONE AREA OF MYANMAR	231
<i>Mukesh S. Boori, Komal Choudhary, Mariele Evers, Rustam Paringer</i>	
THEORETICAL-INFORMATION QUALITY MODEL FOR IMAGE SEGMENTATION	239
<i>Dmitry Murashov</i>	
TRANSFORM-BASED CODING METHOD FOR REMOTE SENSING HYPERSPECTRAL DATA COMPRESSION	249
<i>Ruslan Yuzkiv, Vladislav Sergeev</i>	
METHOD OF AUTOMATIC ROI SELECTION ON LUNG CT IMAGES	258
<i>Andrey Gaidel</i>	
EFFICIENCY COMPARISON OF THE ROUTING ALGORITHMS USED IN CENTRALIZED TRAFFIC MANAGEMENT SYSTEMS	265
<i>Anton Agafonov, Vladislav Myasnikov</i>	
DEVELOPMENT OF COAGULATE MAP FORMATION ALGORITHMS TO CARRY OUT TREATMENT BY LASER COAGULATION	271
<i>N. Ilyasova, A. Shirokanov, D. Kirsh, R. Paringer, A. Kupriyanov, E. Zamycky</i>	
TARGET TRACKING WITH COMPOSITE LINEAR FILTERS ON NOISY SCENES	280
<i>Vitaly Kober, Vladislav Kuznetsov</i>	
HEXAGONAL IMAGES PROCESSING OVER FINITE EISENSTEIN FIELDS	287
<i>Alexander Karkishchenko, Valeriy Mnukhin</i>	
DETECTION OF RADIO PULSES IN UNFILTERED SIGNALS RECEIVED BY SPATIALLY DISTRIBUTED RECEIVERS	296
<i>A. Tashlinskiy, M. Tsaryov</i>	
A HIERARCHICAL ALGORITHM FOR APPROXIMATE NEAREST NEIGHBOR SEARCHING IN A DATASET OF PYRAMID-BASED IMAGE REPRESENTATIONS	302
<i>M. M. Lange, A. M. Lange</i>	
MARKERS DETECTION ON FACIES OF HUMAN BIOLOGICAL FLUIDS	312
<i>V. R. Krashenninnikov, O. E. Malenova, A. S. Yashina</i>	
AFFINE REGISTRATION OF POINT CLOUDS BASED ON POINT-TO-PLANE APPROACH	322
<i>A. Makovetskii, S. Voronin, V. Kober, D. Tihonkih</i>	
KNOWLEDGE-BASED GEOINFORMATION TECHNOLOGY FOR EVALUATION OF AGRICULTURAL LANDS	331
<i>Yu. A. Maglins, K. V. Raevich, G. M. Tsibulskii</i>	

INCREASING THE EFFECTIVENESS OF INTELLIGENT INFORMATION TECHNOLOGY FOR PRODUCING DIGITAL GRAPHIC DOCUMENTS WITH WEAKLY FORMALIZED DESCRIPTION OF OBJECTS	341
<i>Y. Vasin, D. Vasin, T. Utesheva, L. Lebedev, E. Kustov</i>	
TECHNIQUE FOR PROCESSING IMAGERY OF PLANS AND DRAWINGS OBTAINED USING DIGITAL CAMERA	353
<i>Evgeny Myasnikov</i>	
AN APPROACH FOR GIS-BASED TRANSPORT INFRASTRUCTURE MODEL SYNTHESIS ON THE BASIS OF HYPERSPECTRAL INFORMATION	363
<i>A. A. Fedoseev, O. K. Golovnin, T. I. Mikheeva</i>	
SYSTEMATIC APPROACH TO NONLINEAR FILTERING ASSOCIATED WITH AGGREGATION OPERATORS. PART 1. SISO-FILTERS	372
<i>V. Labunets, E. Ostheimer</i>	
SYSTEMATIC APPROACH TO NONLINEAR FILTERING ASSOCIATED WITH AGGREGATION OPERATORS. PART 2. FRÉCHET MIMO-FILTERS	385
<i>V. Labunets, E. Ostheimer</i>	
SIGNALS FOR SYNTHETIC APERTURE RADAR	398
<i>A. Leukhin, V. Bezrodnyi, N. Parsaev</i>	
TWO-DIMENSIONAL PEAK FILTER IN ALMOST LINEAR TIME	408
<i>A. M. Belov, A. V. Verichev, V. V. Myasnikov</i>	
RANK DISTRIBUTION FOR DETERMINING THE THRESHOLD VALUES OF NETWORK VARIABLES AND THE ANALYSIS OF DDOS ATTACKS	417
<i>A. M. Sukhov, E. S. Sagatov, A. V. Baskakov</i>	
PASSWORD-BASED KEY DERIVATION FUNCTION AS ONE OF BLUM-BLUM-SHUB PSEUDO-RANDOM GENERATOR APPLICATIONS	428
<i>Y. D. Vybornova</i>	
A NEW COPY-MOVE FORGERY DETECTION ALGORITHM USING IMAGE PREPROCESSING PROCEDURE	436
<i>Andrey Kuznetsov, Vladislav Myasnikov</i>	
COMPARISON OF THE WAYS OF THE PROGRAM'S CODE INITIAL DESCRIPTION IN THE PROBLEM OF SIMILAR CODE SEQUENCES SEARCH	445
<i>A. S. Yumaganov, V. V. Myasnikov</i>	
A NEW QIM-BASED WATERMARKING ALGORITHM ROBUST AGAINST MULTI-IMAGE HISTOGRAM ATTACK	453
<i>Vitaly Mitekin, Victor Fedoseev</i>	
CHARACTERISTIC OF DECORRELATION PROPERTIES OF SPLINE WAVELET TRANSFORMATION	463
<i>Y. A. Gerasimova</i>	
CALCULATION OF MAXIMUM SAFE TEMPERATURE OF FUEL'S HEATING IN A POROUS MEDIUM	468
<i>Elena Shchepakina</i>	
MATHEMATICAL MODELING OF THERMAL BEHAVIOR FOR ADDITIVE MANUFACTURING WITH METAL POWDER INJECTION	478
<i>A. V. Dubrov, F. Kh. Mirzade, V. D. Dubrov</i>	
SIMULATION OF PLASTIC FORMING PROCESS OF SHELLS WITH MINIMAL THICKNESS FLUCTUATIONS	489
<i>E. G. Demyanenko, I. P. Popov, A. N. Epifanov</i>	
MODELLING OF CRITICAL CONDITIONS FOR AN ELECTROCHEMICAL REACTOR MODEL	495
<i>Natalia Firstova, Elena Shchepakina</i>	
OBJECT RECOGNITION USING REAL AND MODELLED SAR IMAGES	503
<i>D. A. Zherdev, E. Y. Minaev, V. V. Procudin, V. A. Fursov</i>	
MODELING OF NONSTATIONARY DISTRIBUTED PROCESSES ON THE BASIS OF MULTIDIMENSIONAL TIME SERIES	511
<i>M. G. Matveev, A. V. Kopytin, E. A. Sirota, E. A. Kopytina</i>	
DECOMPOSITION OF FLEXIBLE JOINT ROBOT MATHEMATICAL MODEL	517
<i>Nataliya Voropaeva</i>	
SIMULATION MODELING IN HETEROGENEOUS DISTRIBUTED COMPUTING ENVIRONMENTS TO SUPPORT DECISIONS MAKING IN WAREHOUSE LOGISTICS	524
<i>I. Bychkov, G. Oparin, A. Tchernykh, A. Feoktistov, V. Bogdanova, Yu. Dyadkin, V. Andrukhnova, O. Basharina</i>	

JOB FLOW MANAGEMENT FOR VIRTUALIZED RESOURCES OF HETEROGENEOUS DISTRIBUTED COMPUTING ENVIRONMENT	534
<i>I. Bychkov, A. Feoktistov, I. Sidorov, R. Kostromin</i>	
ELASTIC CONSTANTS OF COLLOIDAL CRYSTALS WITH BODY-CENTERED CUBIC LATTICE AND CONSTANT POTENTIAL ON THE PARTICLES	543
<i>A. A. Batanova, P. E. Dyshlovenko</i>	
BOUC-WEN MODEL OF HYSTERETIC DAMPING	549
<i>A. M. Solovyov, M. E. Semenov, P. A. Meleshenko, A. I. Barsukov</i>	
INTEGRAL MANIFOLDS OF FAST-SLOW SYSTEMS IN NONHOLONOMIC MECHANICS	556
<i>Alexander Kobrin, Vladimir Sobolev</i>	
BLACK SWAN AND CURVATURE IN AN AUTOCATALATOR MODEL	561
<i>M. O. Balabaev</i>	
TWO-PHASE QUEUEING SYSTEM OPTIMIZATION IN APPLICATIONS TO DATA TRANSMISSION CONTROL	567
<i>N. A. Kuznetsov, D. V. Myasnikov, K. V. Semenikhin</i>	
HYSTERETIC NONLINEARITY AND UNBOUNDED SOLUTIONS IN OSCILLATING SYSTEMS	578
<i>A. M. Solovyov, M. E. Semenov, P. A. Meleshenko, O. O. Reshetova, M. A. Popov, E. G. Kabulova</i>	
ON THE PARABOLIC SPLINE-INTERPOLATION OF FUNCTIONS WITH A BOUNDARY LAYER	584
<i>I. A. Blatov, E. V. Kitaeva</i>	
ENTANGLEMENT OF ATOMS PASSING CONSECUTIVELY THROUGH ONE-MODE CAVITY	593
<i>E. K. Bashkirov</i>	
THE INFLUENCE OF OPTICAL PROPERTIES OF AU NANOPARTICLES ON THEIR LASER HEATING IN AN INERT MEDIUM	603
<i>M. V. Ananyeva, A. A. Zvekov, E. V. Galkina, A. V. Kalenskii</i>	
NUMERICAL METHODS FOR REACTION KINETICS PARAMETERS: IDENTIFICATION OF LOW-TEMPERATURE PROPANE CONVERSION IN THE PRESENCE OF METHANE	612
<i>L. F. Akhmadullina, L. V. Enikeeva, I. M. Gubaydullin</i>	
MATHEMATICAL MODELLING OF INTELLECTUAL SELF-ORGANIZING AUTOMATIC CONTROL SYSTEM: ACTION PLANNING RESEARCH	617
<i>M. F. Stepanov, A. M. Stepanov</i>	
MATHEMATICAL MODELING OF SIGNAL TRANSFER PROCESS INTO OPTICAL SYSTEM OF A LINEAR DISPLACEMENT ENCODER	623
<i>M. V. Shishova, S. B. Odinokov, D. S. Lushnikov, A. Y. Zherdev, O. A. Gurylev</i>	
MATHEMATICAL MODELLING OF THIN-FILM POLYMER HEATING DURING OBTAINING OF NANOSTRUCTURED ION-PLASMA COATINGS	630
<i>V. I. Bogdanovich, M. G. Giorbelidze</i>	
MATHEMATICAL MODELING OF THE COPOLYMERIZATION OF A-METHYLSTYRENE WITH MALEIC ANHYDRIDE IN A HETEROGENEOUS ENVIRONMENT	639
<i>Igor Grigoryev, Svetlana Mustafina</i>	
PARAMETRIC INVESTIGATION OF MICROSTRUCTURE AFTER LASER MELTING OF METAL POWDER LAYER	645
<i>M. D. Khomenko, F. Kh. Mirzade</i>	
NUMERICAL MODELING OF AEROELASTIC BEHAVIOR OF GTU CENTRIFUGAL COMPRESSOR ROTOR	655
<i>E. V. Mekhonoshina, V. Ya. Modorskii</i>	
NUMERICAL MODELING OF THE LABYRINTH SEAL TAKING INTO ACCOUNT VIBRATIONS OF THE GAS TRANSMITTAL UNIT ROTOR IN AEROELASTIC FORMULATION	666
<i>L. N. Butymova, V. Ya. Modorskii</i>	
DATA EXCHANGE PROTOCOL IN SELF-ORGANIZING COMPUTING ENVIRONMENTS	677
<i>D. V. Filimonov, S. V. Timofeeva, A. M. Sukhov</i>	
THE TEMPLET PARALLEL COMPUTING SYSTEM: SPECIFICATION, IMPLEMENTATION, APPLICATIONS	684
<i>S. V. Vostokin</i>	
DEVELOPMENT OF A VECTOR ALGORITHM OF THREE-DIMENSIONAL CRYSTAL LATTICE PARAMETRIC IDENTIFICATION BASED ON ESTIMATION OF THE SPACING BETWEEN ADJACENT LATTICE PLANES	690
<i>Alexandr Shirokanev, Dmitriy Kirsh, Alexandr Kupriyanov</i>	
PARALLEL ALGORITHMS DESIGN FOR THE MOTION SIMULATION OF TETHERED SATELLITE SYSTEMS USING GRAPH MODELS	698
<i>Alexandr Kovartsev, Victor Zhidchenko</i>	

DEM GENERATION BASED ON RPC MODEL USING RELATIVE CONFORMING ESTIMATE CRITERION	708
<i>A. P. Kotov, Ye. V. Goshin, A. V. Gavrilov, V. A. Fursov</i>	
CNN DESIGN FOR REAL-TIME TRAFFIC SIGN RECOGNITION	718
<i>Alexander Shustanov, Pavel Yakimov</i>	
NUMERICALLY EFFICIENT UD FILTER BASED CHANNEL ESTIMATION FOR OFDM WIRELESS COMMUNICATION TECHNOLOGY	726
<i>I. V. Semushin, Yu. V. Tsyganova, A. V. Tsyganov, E. F. Prokhorova</i>	
A SMART FEATURE SELECTION TECHNIQUE FOR OBJECT LOCALIZATION IN OCULAR FUNDUS IMAGES WITH THE AID OF COLOR SUBSPACES	736
<i>Nataly Ilyasova, Rustam Paringer, Alexandr Shirokanev, Alexandr Kupriyanov, Natalya Ushakova</i>	
COMPARING RIDGE AND LASSO ESTIMATORS FOR DATA ANALYSIS	746
<i>L. E. Melkumova, S. Ya. Shatskikh</i>	
METHOD OF IONOSPHERIC DATA ANALYSIS BASED ON A COMBINATION OF WAVELET TRANSFORM AND NEURAL NETWORKS	756
<i>O. Mandrikova, Yu. Polozov, V. Geppener</i>	
THE PREDICTION ALGORITHM OF THE TECHNICAL STATE OF AN OBJECT BY MEANS OF FUZZY LOGIC INFERENCE MODELS	767
<i>Yu. E. Kuvayskova</i>	
BICONSTITUENT PHENOMENON OF INFORMATION AND COGNITIVE DATA ANALYSIS	773
<i>S. V. Smirnov</i>	
MINIMIZING THE EFFECTS OF FLOOR AND CEILING TO IMPROVE THE CONVERGENCE OF LOG-LIKELIHOOD	779
<i>Ilna Kulikovskikh, Sergej Prokhorov</i>	
FORECASTING THE CHANGE IN THE PARAMETERS OF TIME SERIES AND CONTINUOUS FUNCTIONS	789
<i>A. Y. Proskuryakov, Y. A. Kropotov</i>	
THE NECESSARY BOUND OF RECTANGLE'S SQUARE FOR PACKING INTO THIS ANY SYSTEM OF FIVE AND MORE THAN FIVE FINITE QUANTITY SQUARES WITH TOTAL AREA 1	801
<i>N. Kazanskiy, M. Kuznetsov</i>	
PERFORMANCE ANALYSIS OF REAL-TIME FACE DETECTION SYSTEM BASED ON STREAM DATA MINING FRAMEWORKS	806
<i>Nikolay Kazanskiy, Vladimir Protsenko, Pavel Serafimovich</i>	
EFFICIENCY OF DEEP INTEGRATION BETWEEN A RESEARCH UNIVERSITY AND AN ACADEMIC INSTITUTE	817
<i>N. L. Kazanskiy</i>	
INTERNATIONAL MASTER'S DEGREE PROGRAM "HIGH-PERFORMANCE AND DISTRIBUTED INFORMATION PROCESSING SYSTEMS"	832
<i>E. I. Kolomiets</i>	
ANALYSIS OF THE INTERNATIONAL MASTER'S DEGREE PROGRAM "MATHEMATICAL MODELING AND INFORMATION TECHNOLOGIES IN PHOTONICS"	849
<i>E. I. Kolomiets</i>	
Author Index	