

**XXVI International Conference  
WECONF-2023**

**«2023 WAVE ELECTRONICS AND ITS  
APPLICATION IN INFORMATION  
AND TELECOMMUNICATION SYSTEMS»**

**(IEEE Conference Record #57201)**

**29 May to 02 June 2023**

**CONFERENCE PROGRAM**

**St-Petersburg  
2023**

# CONFERENCE ORGANIZERS

SAINT PETERSBURG STATE UNIVERSITY OF AEROSPACE INSTRUMENTATION (ST. PETERSBURG, RUSSIA)

IEEE – INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS

INSTITUTE OF RADIO AND INFORMATION SYSTEMS – IRIS (VIENNA, AUSTRIA)

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## CONFERENCE SECTIONS\*

**CHAPTER 1. Acoustooptics** (*Акустооптика*)

**CHAPTER 2. Acoustoelectronics** (*Акустоэлектроника*)

**CHAPTER 3. Methods and devices of information processing**  
(*Методы и устройства обработки информации*)

**CHAPTER 4. Data processing and transmission in information and telecommunication systems**  
(*Обработка и передача информации в инфокоммуникационных системах*)

**CHAPTER 5. Round table «Acoustoelectronics and acoustooptics: problems, prospects and applications»**  
(*Круглый стол «Акустооптика и акустоэлектроника: проблемы, перспективы и области применения»*)

**CHAPTER 6. Electromechanics and control systems**  
(*Встроенные микроэлектронные системы*)

**CHAPTER 7. Microelectronic Embedded Systems**  
(*Электромеханика и системы управления*)

**CHAPTER 8. Modeling and situational quality management in electronics and instrumentation**  
(*Моделирование и ситуационное управление качеством в радиоэлектронике и приборостроении*)

**CHAPTER 9. Instrumentation and Intelligent Transportation Systems**  
(*Приборостроение и интеллектуальные транспортные системы*)

**CHAPTER 10. Quantum telecommunications**  
(*Квантовые телекоммуникации*)

\*Доклады в программе внутри секций перечислены в алфавитном порядке по фамилии первого автора. По согласованию с председателем секции порядок следования докладов может быть изменен.

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**Shishlakov V.**, *Professor, Russia*  
**Machikhin A.S.**, *Professor, Russia*  
**Olenev V.L.**, *PhD, Russia*

**MAY 29**  
**(10:30 – 15:00)**

**10:00 – 10:30 REGISTRATION OF PARTICIPANTS**

**10:30 – 15:00 PLENARY SESSION**

**MAY 30 – JUNE 1**

**SECTION MEETINGS**

**JUNE 2**  
**(11:00 – 12:00)**

**CLOSING OF THE CONFERENCE. SUMMING UP,  
AWARDING THE BEST SPEAKERS**

**MAY 30 (10:00 – 17:00)**

**CHAPTER 1  
ACOUSTOOPTICS**

**V.I. Balakshy, S.N. Mantsevich, M.I. Kupreychik**

*Lomonosov Moscow State University, Moscow, Russia*

**DYNAMIC PROCESSES IN A COLLINEAR ACOUSTO-OPTIC GENERATOR  
BASED ON THE EFFECT OF OPTICAL HETERODYNING**

**Vladimir N. Belyi, Nikolai A. Khilo, Piort I. Ropot**

*Institute of Physics of the NAS of Belarus, Minsk, Belarus*

**Piotr A. Khilo**

*Sukhoi State Technical University of Gomel, Gomel, Belarus*

**Sergey V. Kulakov**

*Saint-Petersburg State University of Aerospace Instrumentation, Saint-Petersburg, Russia*

**ACOUSTO-OPTIC INTERACTION OF BESSEL LIGHT BEAMS  
IN THE LIBI(MOO<sub>4</sub>)<sub>2</sub> CRYSTAL**

**A.A. Bykov, D.D. Khohlov, A.Yu. Marchenkov**

*NRU "Moscow Power Engineering Institute", Moscow, Russia;*

*Scientific and Technological Center of Unique Instrumentation of RAS, Moscow, Russia*

**Y.A. Eliovich, V.I. Akkuratov**

*FSRC «Crystallography and Photonics» of RAS, Moscow, Russia*

**MUELLER-MATRIX STRAIN MAPPING IN TeO<sub>2</sub>**

**Ekaterina I. Kostyleva, Sergey N. Mantsevich**

*M.V. Lomonosov Moscow State University, Moscow, Russia*

**QUASICOLLINEAR GEOMETRY OF ACOUSTO-OPTICAL INTERACTION  
IN MERCURY HALIDE CRYSTALS**

**M.I. Kupreychik, V.I. Balakshy**

*Lomonosov Moscow State University, Moscow, Russia*

**INFRARED ACOUSTO-OPTIC FILTERS BASED ON A BIAxIAL CRYSTAL  
OF INDIUM IODIDE FOR COMBINED SPECTRAL-POLARIZATION  
ANALYSIS OF OPTICAL IMAGES**

**Sergey N. Mantsevich, Grigory D. Slinkov, Vladimir I. Balakshy**

*M.V. Lomonosov Moscow State University, Moscow, Russia*

**OPTOELECTRONIC FEEDBACK INFLUENCE ON THE SPECTRAL  
TRANSMISSION OF COLLINEAR ACOUSTO-OPTIC DIFFRACTION**

**Pavel A. Nikitin**

*Scientific and Technological Center of Unique Instrumentation of the RAS, Moscow, Russia;  
National Research University "Moscow Power Engineering Institute", Moscow, Russia*

**GAP EFFECT WIDTH BETWEEN ELECTRODE SECTIONS ON THE  
ACOUSTO-OPTIC DEFLECTOR CHARACTERISTICS BASED  
ON OPTICALLY ISOTROPIC MEDIUM**

**N.V. Polikarpova**

*M.V. Lomonosov Moscow State University, Moscow, Russia*

**TRANSFORMING ACOUSTIC WAVES TO CREATE ACOUSTO-OPTIC  
DEVICES**

**V.E. Pozhar, O.A. Kananykhin**

*Scientific and Technological Centre of Unique Instrumentation of the Russian Academy  
of Sciences (STC UI RAS), Moscow, Russia*

**TWO-CHANNEL SPECTRAL ACOUSTO-OPTICAL SYSTEMS**

**M.V. Marunin, N.V. Polikarpova**

*M.V. Lomonosov Moscow State University, Moscow, Russia*

**NONRECIPROCAL REFLECTION OF ELASTIC WAVES FROM  
A FREE BOUNDARY IN A PARATELLURITE CRYSTAL**

**Ildus Sh. Khasanov, Dmitry V. Churikov, Oleg D. Volpyan**

*Scientific and Technological Centre of Unique Instrumentation of the Russian Academy  
of Sciences, Moscow, Russia*

**POLYNOMIAL PROFILE RECONSTRUCTION OF GRADIENT-INDEX  
THIN FILMS BY SURFACE PLASMON MICROSCOPY BASED ON  
ACOUSTO-OPTICAL TUNABLE FILTER**

**V.S. Khorkin**

*Lomonosov Moscow State University, Moscow, Russia*

**M.S. Kuznetsov, K.S. Zaramenskikh**

*State Scientific-Research and Design Institute of Rare-Metal Industry "Giredmet",  
Moscow, Russia*

**K.A. Subbotin**

*Prokhorov General Physics Institute of the Russian Academy of Sciences, Moscow,  
Russia*

**ACOUSTIC PROPERTIES OF KRS-5 CUBIC CRYSTAL**

**MAY 30 (10:00 – 17:00)**

**CHAPTER 2  
ACoustoelectronics**

**Sergei Doberstein** (*Member IEEE*), **Ivan Veremeev**, **Vladimir Razgonyaev**  
*JSC «ONIIP», Omsk, Russia;*

*Omsk Scientific Center SB RAS (Institute of Radiophysics and Physics Electronics),  
Omsk, Russia*

**ASYNCHRONOUS HIGH QUALITY FACTOR STW-RESONATORS WITH  
SECTIONED REFLECTORS AND GRADUALLY INCREASING PERIOD  
OF THE ELECTRODES**

**A.G. Kozlov**, **T.N. Torgash**

*Omsk Scientific Center SB RAS (Institute of Radiophysics and Physical Electronics),  
Omsk, Russia*

**ANALYSIS OF RESONANT CHARACTERISTICS OF MICROELECTRONIC  
PIEZOELECTRIC RESONATORS WITH A TOP MOLYBDENUM-  
ALUMINUM ELECTRODE**

**Nikolai A. Khilo**, **Vladimir N. Belyi**

*Institute of Physics of the NAS of Belarus, Minsk, Belarus*

**Oleg V. Shakin**

*Saint-Petersburg State University of Aerospace Instrumentation, Saint-Petersburg,  
Russia*

**Piotr A. Khilo**

*Sukhoi State Technical University of Gomel, Gomel, Belarus*

**BESSEL ACOUSTIC BEAMS IN TRANSVERSELY ANISOTROPIC  
TETRAGONAL CRYSTALS**

**MAY 31 (10:00 – 17:00)**

**CHAPTER 3.  
METHODS AND DEVICES OF INFORMATION PROCESSING**

**Nikita Andriyanov, Yulia Kamalova**

*Financial University under the Government of the Russian Federation, Moscow, Russia*

**Vitaly Dementiev**

*Ulyanovsk State Technical University, Ulyanovsk, Russia*

**COMPARISON OF MS CUSTOM VISION AUTO MACHINE LEARNING  
WITH ALGORITHMS IMPLEMENTATION METHODS**

**Mikhail Bakulin, Vitaly Kreyndelin, Taoufik Ben Rejeb, Denis Pankratov,  
Aleksi Smirnov**

*Moscow Technical University of Communications and Informatics, Moscow, Russia*

**ITERATIVE DEMODULATION ALGORITHMS IN NOMA SYSTEMS  
WITH SPARSE CODE SEQUENCES**

**Viktoriya V. Bozhenko, Tatiana M. Tatarnikova**

*Saint Petersburg State University of Aerospace Instrumentation "SUAI", Saint-  
Petersburg, Russia*

**APPLICATION OF DATA PREPROCESSING IN MEDICAL RESEARCH**

**Valeriya Bukova, Anastasia Guryleva**

*Scientific and Technological Center of Unique Instrumentation, Russian Academy  
of Sciences, Moscow, Russia*

**APPLICATION SOFTWARE FOR CARDIOVASCULAR AND MUSCULAR  
STUDIES OF ZEBRAFISH LARVAE**

**S.E. Grychkin, E.P. Stroganova**

*Moscow Technical University of Communications and Informatics, Moscow, Russia*

**"SMART CITY": ELECTROMAGNETIC COMPATIBILITY PROBLEM**



**Anastasia Guryleva**

*Scientific and Technological Center of Unique Instrumentation, Russian Academy of Sciences, Moscow, Russia*

**Mikhail Volkov**

*Scientific and Technological Center of Unique Instrumentation, Russian Academy of Sciences, Moscow, Russia; ITMO University, Saint-Petersburg, Russia*

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**Inna Danilycheva**

*NRC Institute of Immunology FMBA of Russia, Moscow, Russia*

**DIGITAL IMAGE PROCESSING FOR THE DIAGNOSIS OF THE COLD INDUCIBLE URTICARIA BY PHOTOPLETHYSMOGRAPHY-BASED METHODS**

**A.E. Denisov, D.P. Danilaev**

*Kazan National Research Technical University named after A. N. Tupolev – KAI, Kazan, Russia*

**ESTIMATION OF PARAMETERS OF PHOTONIC ANALOG-TO-DIGITAL CONVERTERS**

**Aleksandr N. Zabelin, Oleg S. Litvinov**

*Bauman Moscow State Technical University, Moscow, Russia*

**RECURRENT NEURAL NETWORK APPLICATION FEATURES TO SUPPRESS NON-STATIONARY INTERFERENCE IN AN ADAPTIVE ARRAY**

**I.I. Kochegarov, E.A. Danilova, A.V. Lysenko, I.M. Rybakov, N.K. Yurkov**

*Penza State University, Penza, Russia*

**A TECHNIQUE FOR DETERMINING RESONANT FREQUENCIES OF THIN-WALLED CYLINDRICAL STRUCTURES FOR ON-BOARD RADIO-ELECTRONIC EQUIPMENT**

**Vitaly Kreyndelin, Mikhail Bakulin, Taoufik Ben Rejeb, Denis Pankratov, Aleksei Smirnov**

*Moscow Technical University of Communications and Informatics, Moscow, Russia*

**COMBINATION OF SPATIAL MULTIPLEXING AND NON-ORTHOGONAL MULTIPLE ACCESS NOMA**

**V.F. Lebedev**

*Saint Petersburg State University of Aerospace Instrumentation, Saint Petersburg, Russia*

**I.V.Klepikov, A.V.Koliadin**

*LLC NPK "Almaz", Saint Petersburg, Russia*

**ABLATION AND SURFACE MORPHOLOGY OF HPHT- DIAMOND PLATES DURING LIBS INVESTIGATION**

**Vadim A. Nenashev**

*St.-Petersburg State University of Aerospace Instrumentation, Saint-Petersburg, Russia*

**COMBINING DATA FROM AIRBORNE SPATIALLY DISTRIBUTED MODES OF RADAR IMAGING IN SMALL-SIZED AIRBORNE RADARS**

**Olga V. Opalikhina, Matvey G. Deruzhev**

*Saint-Petersburg University of Aerospace Instrumentation (SUAI), Saint-Petersburg, Russia*

**ALGORITHM FOR OPTIMAL PROCESSING OF INFORMATION PARAMETERS**

**A.P. Pavlov, I.E. Kashchenko**

*IRPE OSC SB RAS, Omsk, Russia*

**SIMULATION MODEL OF A HIGH FREQUENCY SWITCHING ANTENNA-TUNER, OPERATING ON THE BASIS OF NEURAL NETWORKS, WITH DISCRETE COMPONENTS**

**Marat Plaksin, Grigory Mishustin, Vyacheslav Lebedev, Grigory Grishkin,**

**Anton Kurochkin**

*Saint Petersburg State University of Aerospace Instrumentation, Saint Petersburg, Russia*

**COMPARISON OF OPTICAL SCHEMES FOR ANALYSIS OF WINE USING LASER-INDUCED BREAKDOWN SPECTROSCOPY**

**O.B. Popov, T.V. Chernysheva, P.S. Saprnov, A.A. Borisov**

*Moscow Technical University of Communications and Informatics, Moscow, Russia*

**RESEARCH OF DISTORTIONS IN THE FORM PARAMETERS OF AUDIO BROADCASTING SIGNALS USING THE METHOD OF COMPLEX STATISTICAL ESTIMATION**

**I.M. Rybakov, A.V. Lysenko, N.V. Goryachev, I.I. Kochegarov, N.K. Yurkov**

*Penza State University, Penza, Russia*

**ENHANCING THE ACCURACY OF RELIABILITY PREDICTION FOR ELECTRONIC EQUIPMENT THROUGH IMPROVING MODELS AND CALCULATION METHODS**

**MAY 30 (10:00 – 17:00)**  
**MAY 31 (10:00 – 17:00) (резервный день)**

**CHAPTER 4.**  
**DATA PROCESSING AND TRANSMISSION IN INFORMATION  
AND TELECOMMUNICATION SYSTEMS**

**Ilya Averin, Olesya Bolkhovskaya, Anton Elokhin**

*Lobachevsky University, Nizhny Novgorod, Russia*

**SIMPLE ANGLE-OF-ARRIVE BASED ALGORITHM FOR INDOOR  
POSITIONING IN 5G SYSTEMS**

**S.V. Bezzateev, S.G. Fomicheva**

*Saint Petersburg University of Aerospace Instrumentations, Saint Petersburg, Russia*

**G.A. Zhemelev**

*SPbPU, Saint Petersburg, Russia*

**TECHNIQUES FOR ACCELERATING ALGEBRAIC OPERATIONS  
IN AGENT-BASED INFORMATION SECURITY SYSTEMS**

**T.N. Yelina, S.V. Bezzateev, N.S. Krasnikov**

*St. Petersburg State University of Aerospace Instrumentation, St. Petersburg, Russia*

**ANALYSIS OF THE EFFICIENCY OF NEURAL NETWORK TEACHER  
LEARNING METHODS FOR SOLVING IMAGE CLASSIFICATION  
PROBLEMS**

**Ben Rejeb Sofien, Vitaly Kreyndelin**

*Moscow Technical University of Communications and Informatics, Moscow, Russia*

**INVESTIGATION OF THE NOISE IMMUNITY OF MMSE AND ZF  
ALGORITHMS IN MIMO SYSTEMS UNDER CONDITIONS  
OF CORRELATED FADING**

**V.A. Bogatyrev**

*Saint-Petersburg State University of Aerospace Instrumentation, Saint Petersburg, Russia*

**S.V. Bogatyrev, V.V. Sivov**

*ITMO University, Saint-Petersburg, Russia*

**CLUSTER AVAILABILITY MODEL WITH INFORMATION UPDATE FOL-  
LOWING NODE RECOVERY**

**Olesya Bolkhovskaya, Victor Sergeev, Alexander Maltsev**

*Lobachevsky University, Nizhny Novgorod, Russia*

**CRAMER-RAO LOWER BOUNDS FOR THE TASK OF JOINT ESTIMATION  
OF SIGNAL INITIAL PHASE AND AOA IN MULTI-ELEMENT ANTENNA  
ARRAYS**

**Vardges Vardanyan, Artem Maksimov, Anatolij Sychuk**

*SibSUTIS, Novosibirsk, Russia*

**NONLINEAR PHASE DISTORTIONS NOISE IMMUNITY OF MULTIWAVE PULSE SIGNAL TRANSMISSION SYSTEMS**

**Vladimir Yu. Volkov**

*Saint-Petersburg State University of Aerospace Instrumentation;*

*Saint-Petersburg State Electrotechnical University (LETI), Saint-Petersburg, Russia*

**INVESTIGATION OF THE CHARACTERISTICS OF A SPARSE ANTENNA SYSTEM**

**N.A. Davletkildeev, E.Yu. Mosur**

*Omsk Scientific-Research Institute of Instrument Engineering,*

*Omsk Scientific Center SB RAS, Omsk, Russia*

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**S.V. Krivaltsevich**

*Omsk Scientific-Research Institute of Instrument Engineering,*

*Institute of Radiophysics and Physical Electronics of the Omsk Scientific Center SB*

*RAS, Omsk, Russia*

**FEATURES OF APPLICATION OF AN ANALOG FIBER-OPTIC SYSTEM FOR TRANSMITTING HF-UHF SIGNALS**

**Anton Elokhin, Ilya Averin, Olesya Bolkhovskaya, Vadim Sergeev**

*Lobachevsky University, Nizhny Novgorod, Russia*

**AVIATION CHANNEL MODELS DESIGN BASED ON THE EXPERIMENTAL DATA: A TESTBED IMPLEMENTATION**

**M.N. Isaeva, A.A. Ovchinnikov**

*St. Petersburg State University of Aerospace Instrumentation, Saint-Petersburg, Russia*

**ABOUT THE PECULIARITIES OF SEARCHING FOR INFORMATION SETS OF BLOCK-PERMUTATION LDPC-CODES WHEN CORRECTING ERROR BURSTS**

**L.N. Isaeva, A.V. Lobzov**

*Moscow Technical University of Communications and Informatics, Moscow, Russia*

**S.S. Kogan**

*LLC «T8», St-Peterburg, Russia*

**ANALYSIS OF CRITICAL PARAMETERS OF PROMISING OPTICAL INTERFACES OF HIGH-SPEED TELECOMMUNICATION SYSTEMS**

**Le Anh Tu, Evgenia A. Abramova**

*ITMO University, Saint Peterburg, Russia*

**Vladimir A. Bogatyrev**

*Saint-Petersburg State University of Aerospace Instrumentation, Saint Petersburg, Russia*

**RELIABILITY OF A RECONFIGURABLE NETWORK WITH SEGMENT SWITCHING**

**M. A. Mikhalkova**

*Pavlov Institute of Physiology, Russian Academy of Sciences, Saint Petersburg, Russia*

**V. O. Yachnaya, R. O. Malashin**

*Saint-Petersburg State University of Aerospace Instrumentation;*

*Pavlov Institute of Physiology, Russian Academy of Sciences, Saint Petersburg, Russia*

**COMPARATIVE ANALYSIS OF CONVOLUTIONAL NEURAL NETWORKS AND VISION TRANSFORMER ON CLASSIFICATION OF IMAGES CONTAINING HOMOGENOUS MICROSTRUCTURES**

**Reza Mohammadi, Amin Nazari**

*Computer Engineering faculty, Bu-Ali Sina university, Hamedan, Iran*

**Behrooz Daneshmand**

*Saint Petersburg National Research University of Information Technologies, Mechanics and Optics University ITMO, Saint-Petersburg, Russia*

**AN EFFICIENT ROUTING SCHEMA FOR INTERNET OF UNDERWATER THINGS/OCEAN OF THINGS**

**V. A. Mylnikov, S. V. Bezzateev, Y.O. Tretiakova**

*St. Petersburg State University of Aerospace Instrumentation, St. Petersburg, Russia*

**CONVOLUTIONAL NEURAL NETWORK PROTECTION PROBLEMS WITH INPUT DATA MODIFICATION**

**Yuliana A. Novikova, Maksim B. Ryzhikov, Vladimir G. Svanidze**

*Saint Petersburg State University of Aerospace Instrumentation (SUAI), Saint-Petersburg, Russia*

**CONSTRUCTION PRINCIPLES AND MAIN PARAMETERS CALCULATION OF RADAR OF UNMANNED AERIAL VEHICLES FOR USE IN THE ARCTIC ZONE**

**A. A. Ovchinnikov, A. A. Fominykh**

*Saint Petersburg State University of Aerospace Instrumentation, Saint Petersburg, Russia*

**EVALUATION OF ERROR PROBABILITY OF ITERATIVE SCHEMES  
FOR CHANNELS WITH MEMORY**

**Ruslan Zulkashev, Mark Polyak**

*Saint-Petersburg State University of Aerospace Instrumentation, St. Petersburg, Russia*

**SYNTHETIC AUDIO DATA GENERATION ALGORITHM FOR THE  
DIARIZATION PROBLEM**

**Yana Senichenkova, Mark Polyak**

*Saint-Petersburg State University of Aerospace Instrumentation, Saint-Petersburg,  
Russia*

**SYMPHONIC ORCHESTRA MUSICIANS RECOGNITION FROM FACIAL  
IMAGES**

**Maksim B. Ryzhikov**

*Saint Petersburg State University of Aerospace Instrumentation (SUAI),  
Saint-Petersburg, Russia*

**REQUIREMENTS FOR ON-BOARD RADAR ANTENNAS TO REDUCE  
FALSE DETECTIONS OF ARCTIC CLOUDS DUE TO THE PRESENCE  
OF RE-REFLECTIONS FROM THE EARTH'S SURFACE**

**Tatiana M. Tatarnikova, Nikita A. Yankovskii**

*Saint-Petersburg State University of Aerospace Instrumentation (SUAI), Saint-  
Petersburg, Russia*

**DIFFICULTIES IN IMPLEMENTING A HEAVY-TAILED DISTRIBUTION  
USING THE EXAMPLE OF THE PARETO DISTRIBUTION IN MODELING  
NETWORK TRAFFIC**

**Grigoriy Fokin, Ilya Grishin**

*The Bonch-Bruевич SPbSUT, Saint Petersburg, Russia*

**Vladimir Sevidov**

*S.M. Budyonny VAS, Saint Petersburg, Russia*

**LOCATION-AWARE BEAMFORMING METHOD FOR TIME VARYING  
ANGLE OF DEPARTURE IN 5G MMWAVE ULTRA-DENSE NETWORKS**

**Ilya Grishin, Grigoriy Fokin, Vladimir Sevidov, Darina Okuneva**

*The Bonch-Bruевич SPbSUT, Saint Petersburg, Russia*

**Vladimir Sevidov**

*S.M. Budyonny VAS, Saint Petersburg, Russia*

**ANALYSIS OF THE SPATIAL SMOOTHING INFLUENCE ON THE  
PERFORMANCE OF 2D-MUSIC FOR ULTRA-DENSE NETWORKS**

**A. A. Fominykh, A. A. Ovchinnikov**

*Saint Petersburg State University of Aerospace Instrumentation, Saint Petersburg, Russia*

**COMPARATIVE ANALYSIS OF POLAR AND LDPC CODES IN SPACE  
AND SATELLITE COMMUNICATION SYSTEMS**

**Chirov D.S.**

*Moscow Technical University of Communications and Informatics, Moscow, Russia*

**Bolelov E.A., Vasiliev O.V.**

*Moscow State Technical University of Civil Aviation, Moscow, Russia*

**Zyabkin S.A.**

*International Air Navigation Systems Concern, Moscow, Russia*

**FUZZY-LOGICAL CLASSIFIER OF THE PHASE STATE  
OF HYDROMETEORS IN X-BAND WEATHER RADARS**

**S. V. Shevelev, A. V. Shvedov, D. V. Gadasin, I. S. Vakurin**

*Moscow Technical University of Communications and Informatics, Moscow, Russia*

**SYNTAX AND PROBABILITY VECTORS IN SEARCH QUERY**

**MAY 31 (10:00 – 13:00)**

**CHAPTER 6.  
ELECTROMECHANICS AND CONTROL SYSTEMS**

**I.G. Mamedov** (*Member IEEE*), **A. J. Abdullayeva** (*Member IEEE*)  
*Institute of Control Systems ANAS, Baku, Azerbaijan*

**B.G. Ibrahimov** (*Member IEEE*)  
*Azerbaijan Technical University, Baku, Azerbaijan*

**SOME GENERAL CLASSES WELL-POSED THREE-DIMENSIONAL  
BOUNDARY VALUE PROBLEMS IN THE MIDDLE OF THE DOMAIN  
FOR HYPERBOLIC EQUATIONS**

**Oleg G. Morozov** (*Senior Member IEEE*), **Jerdawi Dahham**, **Aida Z. Petrova**  
*Kazan National Research Technical University named after A.N. Tupolev-KAI,  
Kazan, Russia*

**Nikita E. Kuvshinov**, **Rinat Sh. Misbakhov**  
*Innopolis University, Innopolis, Russia*

**REMOTE TEMPERATURE MONITORING OF MATERIALS PROCESSING  
IN MICROWAVE REACTOR BASED ON CALORIMETRIC METHOD  
AND MATRIX OF THERMO-CONVERTERS**

**Vyacheslav B. Rogozhin**  
*Saint-Petersburg State University of Aerospace Instrumentation, St. Petersburg, Russia*  
**SYSTEM OF ELECTROMECHANICAL PUMPING OF AN OSCILLATORY  
CIRCUIT WITH ACTIVE RESISTANCE SUPPRESSION**

**Ayrat Zh. Sakhabutdinov**, **Oleg G. Morozov** (*Senior Member IEEE*),  
**Rustam Sh. Misbakhov**  
*Kazan National Research Technical University named after A.N. Tupolev-KAI, Kazan,  
Russia*

**Alexandr A. Potanin**, **Ildus U. Kurbiev**  
*SPC "Sensorika", Ltd., Skolkovo, Moscow, Russia*  
**MICROWAVE PHOTONIC APPROACH FOR OPTIC DIFFERENTIAL  
FLOWMETERS ON TWO FIBER BRAGG GRATINGS**

**Nikita Tretyakov**, **Aleksey Bobryshov**, **Vladimir Kuzmenko**, **Oksana Solenaja**  
*St. Petersburg State University of Aerospace Instrumentation, Saint-Petersburg, Russia*  
**CONTROL SYSTEM MODELING AND SIMULATION FOR ACTIVE  
FILTERS OF THE HIGH-FREQUENCY HARMONICS**



**MAY 30 (15:00 – 18:00)**

**CHAPTER 7.  
MICROELECTRONIC EMBEDDED SYSTEMS**

**Dmitriy Kleimenkin, Nikolay Prokopenko, Vladislav Chumakov,  
Marsel Sergeenko**

*Don State Technical University, Rostov-on-Don, Russia*

**HIGH-SPEED OPERATIONAL AMPLIFIER WITH NONLINEAR TRANSIENT  
CORRECTION CIRCUITS IN THE INPUT AND INTERMEDIATE STAGES**

**Danila A. Luzhaitsev, Artyom O. Turov, Yuri A. Miller, Dmitry S. Hohol,  
Pavel E. Troyan**

*Tomsk State University of Control System and Radioelectronics, Tomsk, Russia*

**DESIGN COMPARING OF MONOLITHIC INTEGRATED CIRCUIT  
A SINGLE-STAGE TRANSISTOR AMPLIFIER WITH INTEGRATED  
POWER LIMITER**

**V.M. Novikov, N.I. Sel'vesyuk**

*State Research Institute of Aviation Systems (GosNIIAS), Moscow, Russia*

**V.L. Olenev, E.A. Suvorova**

*Saint-Petersburg State University of Aerospace Instrumentation, Saint Petersburg, Russia*

**METHODS FOR THE RELIABILITY AUGMENTATION OF DETERMINIS-  
TIC OPTICAL REAL-TIME NETWORKS**

**Nikolay Prokopenko, Vladislav Chumakov, Marsel Sergeenko**

*Don State Technical University, Rostov-on-Don, Russia*

**DIFFERENTIAL AMPLIFIERS AND DAC DISCHARGING CURRENT  
SWITCHES WITH DIFFERENTIATING TRANSIENT CORRECTION  
CIRCUITS**

**Khusen K. Begimov**

*Tajik State Pedagogical University named after Sadriddin Aini, Dushanbe, Tajikistan*

**Lolai Husenzoda**

*International University of Tourism and Entrepreneurship of Tajikistan, Dushanbe,  
Tajikistan*

**Dilshod C. Ravshanov (Member IEEE), Jamoliddin B. Kamolidinov,**

**Asliya S. Rajabova**

*Tajik Technical University named after academician M.S. Osimi, Dushanbe, Tajikistan*

**1 GHZ POWER DIVIDER WITH REDUCED BOARD DIMENSIONS**

**Lolai Husenzoda**

*International University of Tourism and Entrepreneurship of Tajikistan, Dushanbe, Tajikistan*

**Nuriddini Fayz, Dilshod C. Ravshanov (Member IEEE), Bahriddin S. Safarov, Rajab S. Umaralizoda**

*Tajik Technical University named after academician M.S. Osimi, Dushanbe, Tajikistan*

**INVESTIGATION OF THE EFFECT OF BOARD THICKNESS ON TAP MINIATURIZATION PERFORMANCE**

**Elena Suvorova**

*Saint-Petersburg State University of Aerospace Instrumentation, Saint Petersburg, Russia*

**DYNAMICALLY RECONFIGURABLE AUTOMATA FOR ESTIMATING INTERACTION BETWEEN DATA FLOWS IN HIGH-PERFORMANCE COMPUTING SYSTEMS**

**V. E. Chumakov, N.N. Prokopenko, M. A. Sergeenko**

*Don State Technical University, Rostov-on-Don, Russia*

**A.V. Kunts**

*Institute of nuclear problems Belarusian state university, Minsk, Belarus*

**ARCHITECTURES AND CIRCUITRY OF GAAS OPERATIONAL AMPLIFIERS FOR INSTRUMENTATION AND INTEGRATED MICROELECTRONIC SYSTEMS**

**N. Yu. Chumakova, E.A. Suvorova**

*Saint-Petersburg State University of Aerospace Instrumentation, Saint-Petersburg, Russia*

**DEPENDENCE OF BROADCAST PROPAGATION TIME IN SPACEFIBRE NETWORKS WITH DIFFERENT SPATIAL REDUNDANCY**

**MAY 31 (10:00 – 13:00)**

**CHAPTER 9.  
INSTRUMENTATION AND INTELLIGENT  
TRANSPORTATION SYSTEMS**

**Mikhail Gorodnichev, Moseva Marina**

*Moscow Technical University of Communications and Informatics, Moscow, Russia*

**ON THE PROBLEM OF DEVELOPING A FAULT-TOLERANT  
HIGH-LOADED CLUSTER OF SUPPORT FOR AN INTELLIGENT  
TRANSPORTATION SYSTEM**

**M. Yu. Karelina, Doctor of Technical Sciences, Professor**

*GUU, Moscow, Russia*

**A.A. Terentyev, V.V. Filatov, A.A. Akulov, D.S. Taldykin**

*MADI, Moscow, Russia*

**COMPREHENSIVE DEVELOPMENT OF THE ZONING METHOD WITH ITS  
SUBSEQUENT IMPLEMENTATION IN A MULTI-CRITERIA VEHICLE LIFE  
MANAGEMENT SYSTEM**

**Sergey V. Kozlov, Alexander P. Shabanov**

*Federal Research Center “Computer Science and Control” Russian Academy  
of Sciences, Moscow, Russia*

**Alexander N. Kubankov**

*Moscow Technical University of Communications and Informatics, Moscow, Russia*

**UNMANNED AIRCRAFT SYSTEMS IN LOGISTICS PROCESSES WITH  
NETWORK MANAGEMENT**

**Mikhail F. Mitsik, Marina V. Byrdina, Igor M. Maltsev, Victoria S. Belysheva**

*Institute of Service and Entrepreneurship (branch) of DSTU, Shakhty, Russia*

**APPLICATION OF ROBOTIC DEVICES FOR INFORMATION MODELING  
IN CIVIL CONSTRUCTION**

**Grach Mkrtchian, Mikhail Gorodnichev, Sergey Simonov**

*Moscow Technical University of Communications and Informatics, Moscow, Russia*

**ABOUT CHOOSING THE AUDIO SIGNAL REPRESENTATION  
IN THE TASK OF VEHICLE PATTERN RECOGNITION**

**Marina Moseva, Ksenia Polyantseva**

*Moscow Technical University of Communications and Informatics, Moscow, Russia*

**ON METHODS OF VERIFICATION OF MATHEMATICAL MODELS  
OF TRAFFIC FLOWS ON REAL DATA**

**Ksenia Polyantseva, Mikhail Gorodnichev, Yaroslav Mitrokhin, Moseva Marina**  
*Moscow Technical University of Communications and Informatics, Moscow, Russia*  
**ON THE PROBLEM OF DEVELOPING A REALISTIC ROAD  
INFRASTRUCTURE SIMULATOR FOR REINFORCED LEARNING**

**Anton Yu. Poroykov, Nikita Yu. Sivov, Ekaterina V. Shmatko**  
*National Research University "MPEI", Moscow, Russia*  
**DEVELOPMENT OF A PHASOGRAMMETRIC MEASUREMENT SYSTEM  
FOR ERROR ESTIMATION IN CLOSE-RANGE PHOTOGRAMMETRY**

**Nikita Yu. Sivov, Ekaterina V. Shmatko, Anton Yu. Poroykov**  
*National Research University "MPEI", Moscow, Russia*  
**ESTIMATING THE FEASIBILITY OF IMAGES SIMULATION IN UNITY  
3D FOR SUB-PIXEL PROCESSING ALGORITHMS**

**Sergey Simonov, Marina Moseva, Ksenia Polyantseva, Grach Mkrtchian**  
*Moscow Technical University of Communications and Informatics, Moscow, Russia*  
**ON THE TASK OF LOCALIZATION OF ROAD INFRASTRUCTURE OB-  
JECTS BASED ON AUDIO SIGNALS**

**MAY 30 (10:00 – 13:00)**

**CHAPTER 10.  
QUANTUM TELECOMMUNICATIONS**

**E. V. Burlakov, A. V. Korobov**

*Moscow Technical University of Communications and Informatics, Moscow, Russia*

**CONTINUOUS-VARIABLE QUANTUM KEY DISTRIBUTION:  
BACKGROUND AND PERSPECTIVES**

**G.S. Grishkin, Y.A. Ryvkina, V.I. Kazakov, A.A. Shakhov**

*St. Petersburg State University of Aerospace Instrumentation (SUAI), Saint Petersburg, Russia*

**QUANTUM EFFICIENCY OF A SINGLE PHOTON DETECTOR  
EXPERIMENTAL ESTIMATION**

**Sergey Ermak, Vladimir Semenov, Olga Ermak**

*Peter the Great St. Petersburg Polytechnic University, St. Petersburg, Russia*

**Alexander Kryachko, Oleg Shakin**

*Saint-Petersburg State University of Aerospace Instrumentation, St. Petersburg, Russia*

**USE OF OPTICALLY PUMPED QUANTUM MAGNETOMETERS AS SIGNAL  
RECEIVERS IN THE ULTRA-LONG WAVELENGTH RANGE**

**Zaitcev A., Kolesnikov O., Kazieva T., Isaeva L., Yerokhin K.**

*Moscow Technical University of Communications and Informatics, Moscow, Russia*

**QUANTUM KEY DISTRIBUTION THROUGH A MULTI-CORE OPTICAL  
FIBER**

**N. Ivankov, D. Tupyakov**

*ITMO University, Saint Petersburg, Russia*

**R. Goncharov**

*ITMO University, Saint Petersburg, Russia;*

*SMARTS-Quanttelecom LLC., Saint Petersburg, Russia*

**SOLUTION OF THE CONVEX OPTIMIZATION PROBLEM FOR SUBCARRI-  
ER WAVE CONTINUOUS-VARIABLE QUANTUM KEY DISTRIBUTION  
PROTOCOL WITH DISCRETE MODULATION**

**D.V. Bolotov, S.Y. Kazantsev, N.V. Pchelkina**

*Moscow Technical University of Communications and Informatics, Moscow, Russia*

**S.N. Kuznetsov, M.Y. Kernosov**

*MOSTCOM JSC, Ryazan, Russia*

**MODULAR FACILITY OF QUANTUM KEY DISTRIBUTION IN A FREE SPACE**

**T.V. Kazieva**

*Moscow Technical University of Communications and Informatics, Moscow, Russia;  
National Research Nuclear University MEPhI, Moscow, Russia*

**O.S. Belova, A.G. Temnikov**

*National Research University "Moscow Power Engineering Institute", Moscow, Russia*

**D.V. Bolotov, O.V. Kolesnikov**

*Moscow Technical University of Communications and Informatics, Moscow, Russia*

**LABORATORY SETUP FOR STUDYING THE EFFECT OF ATMOSPHERIC  
DISCHARGES ON COMMUNICATION LINES PROTECTED BY QUANTUM  
KEY DISTRIBUTION TECHNOLOGY**

**Vladimir G. Popov**

*JSC Infotecs, Moscow, Russia;*

*Moscow Institute of Physics and Technology, Dolgoprudny, Moscow region, Russia;*

*Financial University, Moscow, Russia*

**Sergey V. Alferov**

*JSC Infotecs, Moscow, Russia*

**Stepan B. Bychkov**

*All-Russian Research Institute for Optical and Physical Measurement, Moscow, Russia*

**TESTING OF FIBER-OPTIC LINES FOR QUANTUM KEY DISTRIBUTION**

**J. Rabenandrasana (Member IEEE), N.V. Pchelkina , S.Y. Kazantsev**

*Moscow Technical University of Communications and Informatics, Moscow, Russia*

**P.M. Bokov**

*North-West University, Potchefstroom, South Africa;*

*The South African Nuclear Energy Corporation SOC Ltd, Pelindaba, South Africa*

**K. Matabane**

*The South African Nuclear Energy Corporation SOC Ltd, Pelindaba, South Africa*

**WAVEFRONT CONTROL OF WIDE APERTURE LASER BEAMS  
FOR QUANTUM KEY DISTRIBUTION PROBLEMS IN FREE SPACE**

**Roman Shakhovoy**

*Moscow Technical University of Communications and Informatics, Moscow, Russia*

*NTI Center for Quantum Communications, Moscow, Russia;*

*NUST MISIS, Moscow, Russia*

**DIGITIZATION OF A RANDOM SIGNAL FROM THE INTERFERENCE  
OF LASER PULSES. ISSUE OF RANDOMNESS EXTRACTION FOR A  
QUANTUM RANDOM NUMBER GENERATOR**