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WECONF-2021**

**«2021 WAVE ELECTRONICS AND ITS
APPLICATION IN INFORMATION
AND TELECOMMUNICATION SYSTEMS»**

(IEEE Conference Record #51603)

31 May to 04 June 2021

CONFERENCE PROGRAM

**St-Petersburg
2021**

ОРГАНИЗАТОРЫ КОНФЕРЕНЦИИ

САНКТ-ПЕТЕРБУРГСКИЙ ГОСУДАРСТВЕННЫЙ УНИВЕРСИТЕТ
АЭРОКОСМИЧЕСКОГО ПРИБОРОСТРОЕНИЯ (ГУАП)

ИНСТИТУТ РАДИОТЕХНИКИ И ЭЛЕКТРОНИКИ ИМ. В. А. КОТЕЛЬНИКОВА
РОССИЙСКОЙ АКАДЕМИИ НАУК, г. МОСКВА

АО «МОРИОН», г. САНКТ-ПЕТЕРБУРГ

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РЕГИОНАЛЬНЫЙ ЦЕНТР НТИ ПО НАПРАВЛЕНИЮ «ТЕХНОЛОГИИ БЕСПРОВОДНОЙ СВЯЗИ
И ИНТЕРНЕТА ВЕЩЕЙ» ПО СЕВЕРО-ЗАПАДНОМУ ФЕДЕРАЛЬНОМУ ОКРУГУ

СЕКЦИИ КОНФЕРЕНЦИИ*

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*)

* 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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Bezateev S., *PhD, Russia*
Sheynin Yu. E., *Professor, Russia*

MAY 31 (10:30 – 14:30)

10:30 – 11:00 REGISTRATION OF PARTICIPANTS

11:00 – 11:30 CONFERENCE OPENING

11:30 – 14:30 PLENARY SESSION

JUNE 1 – JUNE 3

SECTION MEETINGS

JUNE 4 (11:00 – 12:00)

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

1 JUNE (10:00 – 16:00)

**CHAPTER 1 & CHAPTER 2
ACOUSTOOPTICS AND ACOUSTOELECTRONICS**

V.I. Anisimkin

Kotel'nikov Institute of Radioengineering and Electronics RAS, Moscow, Russia

N.V. Voronova

Acoustoelectronic and Piezoceramic ELPA Corporation, Moscow, Russia

**SENSING THE LIQUID PROPERTIES AND LIQUID-TO-ICE
TRANSFORMATION USING NEW MODIFICATION
OF THE ULTRASONIC LAMB WAVES**

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

Lomonosov Moscow State University, Moscow, Russia

**ACOUSTO-OPTIC DEVICES WITH PHASED-ARRAY TRANSDUCERS.
FEATURES OF OPERATION AND APPLICATIONS**

O.L. Balysheva

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

SAW FILTERS AND MOBILE COMMUNICATION SYSTEMS

V.I. Batshev, S.V. Boritko A.B. Kozlov, M.O. Sharikova

Scientific and Technological Center of Unique Instrumentation,

Russian Academy of Sciences, Moscow, Russia

V.A. Lomonov

Federal Scientific Research Center "Crystallography and Photonics",

Russian Academy of Sciences, Moscow, Russia

**OPTICAL SYSTEM OF VISIBLE AND SHORT-WAVE INFRARED
AOTF-BASED SPECTRAL IMAGING DEVICE**

Vladimir N. Belyi, Nikolai S. Kazak

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

Piotr A. Khilo

Sukhoi State Technical University of Gomel, Gomel, Belarus

Nikolai A. Khilo

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

**TRANSFORMATION OF GAUSSIAN-LIKE BEAM INTO BESSEL LIGHT
BEAM AT ACOUSTO-OPTIC INTERACTION**

Cinzia Caliendo, Ennio Giovine

Institute for Photonics and Nanotechnology, IFN-CNR, Unit of Rome, Roma, Italy

Muhammad Hamidullah

FEMTO-ST Institute, Besançon, France

Farouk Laidoudi

Research Centre in Industrial Technology, CRTI, P-O. box 64, Cheraga, Algiers, Algeria

**ZERO GROUP VELOCITY LAMB MODE RESONATORS
ON 36°-YX LINBO₃ THIN PLATES**

A.S. Koigerov

St. Petersburg Electrotechnical University, "LETI", Saint Petersburg, Russia

O.L. Balysheva

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

**NUMERICAL APPROACH FOR EXTRACTION COM SURFACE ACOUSTIC
WAVE PARAMETERS FROM PERIODIC STRUCTURES ANALYSIS**

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

Lomonosov Moscow State University, Faculty of Physics, Moscow, Russia

**DIFFRACTION OF UNPOLARIZED RADIATION IN ACOUSTO-OPTIC CELLS
BASED ON BIAXIAL CRYSTALS WITH PHASED-ARRAY TRANSDUCERS**

S.N. Kurilkina, V.N. Belyi

B.I. Stepanov Institute of Physics of the NAS of Belarus, Minsk, Belarus

S.V. Kulakov

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

**ELECTROINDUCED DIFFRACTION-FREE PROPAGATION OF ACOUSTIC
BEAMS IN CUBIC CENTROSYMMETRIC CRYSTALS WITH HIGH DIELEC-
TRIC PERMITTIVITY**

M.V. Marunin, N.V. Polikarpova

Lomonosov Moscow State University, Moscow, Russia

**ACOUSTIC PROPERTIES OF TWO-DIMENSIONAL PHONONIC
CRYSTALS BASED ON FUSED SILICA**

N.V. Polikarpova, M.V. Marunin, I.K. Chizh

Lomonosov Moscow State University, Moscow, Russia

IR ACOUSTO-OPTIC DEVICES USING ACOUSTIC REFLECTION

V.E. Pozhar, A.S. Machikhin

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

ACOUSTO-OPTICAL IMAGING SPECTROSCOPY

N.A. Rozhkova, V.E. Pozhar

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

**OPTICAL TWEEZERS WITH BI-AXIS ACOUSTO-OPTICAL
DEFLECTOR FOR PARTICAL MANIPULATION**

Anton A. Sentsov

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

Irina G. Bukaeva

Limited Liability Company "Medical Center No. 157", Saint Petersburg, Russia

Galina I. Neuimina

*V. I. Vernadsky Federal State University, S. I. Georgievsky Medical Academy,
Simferopol, Russia*

**FEATURES OF USING EXTREMELY HIGH-FREQUENCY LOW-INTENSITY
ELECTROMAGNETIC RADIATION IN MEDICAL PRACTICE**

T.N. Torgash, A.G. Kozlov, N.A. Chirikov, V.I. Strunin

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

**ANALYSIS OF LADDER FILTERS BASED ON SOLIDLY MOUNTED
RESONATORS WITH ALUMINUM NITRIDE THIN FILM**

A.R. Zhezherin, A.S. Paraskun

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

**MEASUREMENT OF SURFACE ACOUSTIC WAVES VELOCITY
IN PIEZO SUBSTRATE**

2 JUNE (10:00 – 17:00)

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

**Aleksandr R. Bestugin, Maksim B. Ryzhikov, Yuliana A. Novikova,
Irina A. Kirshina**

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

**INVESTIGATION OF CONDITIONS FOR DETECTING FALSE WINDSHEAR
AREAS IN WEATHER RADAR FOR LOW-ALTITUDE FLIGHTS OF SMALL
AIRCRAFTS**

Alexandr K. Ermakov

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

T.Yu. Portnova, B.V. Lezhankin, V.V. Erokhin

Moscow State Technical University of Civil Aviation, Irkutsk Branch, Irkutsk, Russia

**TRAJECTORY CONTROL ALGORITHMS FOR UNMANNED AIRCRAFT
COMPLEXES FLYING IN FORMATION**

R.R. Fayzullin, G.I. Il'in, A.G. Il'in, A. Sychev

*Kazan National Research Technical University n.a. A.N. Tupolev – KAI (KNRTU-KAI),
Kazan, Russia*

V.I. Il'in

Kazan Federal University, Kazan, Russia

**COMPARATIVE ANALYSIS OF SPECTRAL CHARACTERISTICS
OF SIGNALS WITH SMOOTH ENVELOPES**

A.D. Filin, A.R. Bestugin, I.A. Kirshina

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

**THE AVIATION VIRTUAL ELECTRONIC POLYGON ONBOARD
INFORMATION COMPLEX SIMULATION STRUCTURE**

O. A Gorbachev.

Moscow State Technical University of Civil Aviation, Irkutsk Branch, Irkutsk, Russia

N.V. Povarenkin

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

B.V. Lezhankin, V.V. Erokhin

Moscow State Technical University of Civil Aviation, Irkutsk Branch, Irkutsk, Russia

**ALGORITHM OF OPTIMAL CONTROL OVER THE OUTPUT POWER
OF THE TRANSMITTER OF AN AUTOMATIC DEPENDENT
SURVEILLANCE BROADCAST TRANSPONDER**

Aleksei P. Grunin, Sergey V. Sai, Bogdan P. Zakirov

Pacific National University, Khabarovsk, Russia

ALL-IN-VIEW TIME DIFFERENCE SOLUTION FOR ELORAN

S.Y. Gukov

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

**COMPARATIVE ANALYSIS OF WAYS TO SOLVE THE INTERFERENCE
PROBLEM TOF-CAMERAS**

V.I. Kazakov

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

**OPTIMIZATION OF THE TRANSMISSION FUNCTION OF THE
DIFFRACTION GRATING FOR OPERATION IN HIGHER ORDERS**

Demid D. Khokhlov

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

Mikhail V. Volkov

ITMO University, Saint Petersburg, Russia

Inna V. Danilycheva

Federal Medical Biological Agency, Moscow, Russia

Alexander S. Machikhin, Ekaterina D. Lovchikova

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

**DESIGN OF THE OPTICAL SYSTEM FOR EXOSCOPE-BASED
VIDEOCAPILLAROSCOPY**

A.A. Khomenko

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

**DEVELOPMENT AND JUSTIFICATION OF THE ALGORITHM
FOR SPATIAL ADAPTIVE SUPPRESSION OF PULSE INTERFERENCE**

S.V. Kulakov, M.A. Vaganov, V.I. Kazakov

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

**EXPERIMENTAL STUDY OF THE INFLUENCE OF AMBIENT
TEMPERATURE ON THE TRANSMISSION OF THE ANALYZED
SIGNAL THROUGH AN OPTICAL FIBER**

I.M. Lerner, G.I. Il'in, A.G. Il'in, R.R. Fayzullin, A. Sychev

*Kazan National Research Technical University n.a. A.N. Tupolev – KAI (KNRTU-KAI),
Kazan, Russia*

V.I. Il'in

Kazan Federal University, Kazan, Russia

**TO THE FORMATION OF PRINCIPLES OF SYMBOL SYNCHRONIZATION IN
REDTS, IMPLEMENTING THE PRINCIPLES OF THE THEORY OF RESOLU-
TION TIME**

T.S. Misnikova, M.A. Vaganov

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

**APPLICATION OF OPTICAL SPECTROSCOPY METHODS
TO COMBUSTION PROCESSES DIAGNOSTICS**

Andrei A. Monakov

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

RADAR DETECTION AND RECOGNITION OF A HOVERING HELICOPTER

Oleg D. Moskaletz

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

FORMATION AND DETECTION OF SIGNALS IN THE OPTICAL RANGE

D.O. Moskaletz, O.D. Moskaletz, A.S. Paraskun

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

**METHODS OF THE THEORY OF RANDOM PROCESSES IN OPTICAL
SPECTROMETRY**

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

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

**ERRORS AND DISTORTIONS OF THE CHARACTERISTICS OF A MULTI-
CHANNEL PHASED ANTENNA ARRAY WITH DIRECTIONAL ASYMMETRY
OBTAINED BY SYNTHETIC METHOD IN AVIATION WEATHER
NAVIGATION RADAR**

Ivan D. Petrov

Peter the Great St.-Petersburg Polytechnic University, Saint Petersburg, Russia

Anton A. Sentsov

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

Sergey A. Ivanov

St.-Petersburg State University of Economics, Saint Petersburg, Russia

**FEATURE EXTRACTION AND RECOGNITION OF AERIAL OBJECTS
USING ECHO SIGNALS RECEIVED BY RADAR**

Vadim B. Polyakov, Natalya A. Ignatova, Anton A. Sentsov

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

**MULTI-CRITERIA SELECTION OF THE RADAR DATA COMPRESSION
METHOD**

Nikolay V. Povarenkin, Nikita A. Venedictov, Aleksandr K. Ermakov

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

**JUSTIFICATION OF THE REQUIRED TACTICAL AND TECHNICAL
CHARACTERISTICS OF AIR SPACE SURVEY RADARS TO ENSURE
TIMELY DETECTION OF SMALL AIRCRAFT**

Maksim B. Ryzhikov, Vladimir G. Svanidze, Yu. A. Novikova

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

**DISTORTIONS OF CHARACTERISTICS OF A MULTICHANNEL ANTENNA
ARRAY WITH DIRECTIONAL ASYMMETRY BY THE COMPENSATION
METHOD IN AN AVIATION WEATHER NAVIGATION RADAR**

K.V. Serdiuk, O.D. Moskaletz, V.I.Kazakov

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

**FORMATION OF COMPLEX AND ENERGY SPECTRA IN DIFFRACTION
SPECTRAL DEVICES: THE RADIO-OPTICAL APPROACH**

Alexander P. Shepeta, Vadim A. Nenashev

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

**OPTIMIZATION THE SIZE OF THE SEARCH AREA FOR MOVING
PHYSICAL OBJECTS BASED ON PRELIMINARY TARGET
DESIGNATION DATA**

Alexander V. Sorokin, Alex P. Shepeta

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

**ASPECTS OF PASSIVE SURFACE ACOUSTIC WAVE TAG SIGNAL
DETECTION UNDER DIFFERENT DETECTOR PARAMETERS**

V.Yu. Volkov

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

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

RADAR OBJECTS MODELLING AND SELECTION IN SPECKLE IMAGES

P.A. Volynkin

The Bonch-Bruевич Saint Petersburg State University of Telecommunications (SPbSUT),

Saint-Petersburg, Russia

FREQUENCY PORTRAITS IN AUTHORSHIP IDENTIFICATION

A.N. Yakimov, A.R. Bestugin, I.A. Kirshina

The Institute of Radio Engineering, Electronics and Communication of SUAI,

Saint-Petersburg, Russia

**MODELING OF THE USE CORNER REFLECTOR OF ELECTROMAGNETIC
WAVES IN THE GROUND RADIO LINE OF COMMUNICATION**

Andrey L. Yakovenko, Mikhail G. Shatrov, Igor V. Alekseev, Sergey N. Bogdanov,

Andrey O. Glazkov

Moscow Automobile and Road Construction State Technical University (MADI),

Moscow, Russia

**SPECIFICITY OF MODELING OF THE STRUCTURE-BORNE NOISE
OF THE DIESEL ENGINE FROM THE WORKING PROCESS
IN THE ACCELERATION MODE**

1 JUNE (10:00 – 17:00)

3 JUNE (10:00 – 14:00)

CHAPTER 4.

**DATA PROCESSING AND TRANSMISSION IN INFORMATION
AND TELECOMMUNICATION SYSTEMS**

A. S. Adzhemov, *Member, IEEE*, A. Y. Kudryashova

Moscow Technical University of Communications and Informatics, Moscow, Russia

DISTORTION WITH MULTIPLE DISCRETE MODULATION TECHNIQUES

A.V. Agranovskii, A.P. Silukov

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

**COMPARATIVE ANALYSIS OF RESULTS OF MODERN CLASSIFICATION
ALGORITHMS USAGE FOR DETERMINING THE TYPE OF PHYSICAL AC-
TIVITY BASED ON INTEGRATED SENSORS DATA**

**Ivan G. Babanin, Vladimir G. Andronov, Dmitry S. Koptev, Anton I. Nikolaenko,
Aleksandr E. Sevriukov**

Southwest State University, Kursk, Russia

**THE CONCEPTUAL LEVEL OF ANALYSIS AND ITS PLACE IN THE
INFOLOGICAL SYSTEM OF INFORMATION AND ANALYTICAL SUPPORT
IN THE TASKS OF OPERATIONAL ASSESSMENT OF THREATS POSED
BY UNMANNED AERIAL VEHICLES**

M.G. Bakulin, V.B. Kreindelin, D.Y. Pankratov, A.G. Stepanova

Moscow Technical University of Communications and Informatics, Moscow, Russia

**APPLYING A NEW APPROXIMATION TO DEMODULATION
IN MASSIVE MIMO SYSTEMS**

D.A. Belokurov, E.S. Shamakova, V.S. Kolomoitsev

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

**USING MACHINE LEARNING TECHNIQUES TO IDENTIFY BOT
ACCOUNTS ON A SOCIAL NETWORK**

Sergey V. Bezzateev, Svetlana G. Fomicheva

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

Georgiy A. Zhemelev

SPbPU, Saint Petersburg, Russia

AGENT-BASED ZEROLOGON VULNERABILITY DETECTION

V.A. Bogatyrev

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

A.V. Bogatyrev, S.V. Bogatyrev

JSC "NEO Saint Petersburg Competence Center", Saint Petersburg, Russia

REDUNDANT SERVICE WITH REGULATION OF THE NUMBER OF WAITING PLACES IN NODES

S.V. Bogatyrev, A.V. Bogatyrev

JSC "NEO Saint Petersburg Competence Center", Saint Petersburg, Russia

V.A. Bogatyrev

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

PRIORITY MAINTENANCE WITH REPLICATION OF WAIT-CRITICAL REQUESTS

Anna V. Borisovskaya, Andrey M. Turlikov

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REDUCING ENERGY CONSUMPTION IN THE IOT SYSTEMS WITH UNLIMITED NUMBER OF DEVICES

Artem A. Burkov

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

Seva Shneer

Statistics at Heriot-Watt University, Edinburgh, United Kingdom

Andrey M. Turlikov

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

ARBITRARILY ACCURATE APPROXIMATION OF NUMERICAL CHARACTERISTICS OF STATIONARY ALOHA CHANNELS

Artem A. Chemodanov, Timofey S. Klimov, Oleg A. Nesterenkov, Igor A. Pastushok

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

PERFORMANCE EVALUATION OF WEB TRAFFIC TRANSMISSION IN CENTRALIZED WIRELESS NETWORKS

O.G. Chertova, D.S. Chirov, Member, IEEE, K.Y. Rymshin

Moscow Technical University of Communications and Informatics, Moscow, Russia

ALGORITHM OF UAVS AUTOMATIC CONTROL FOR BUILDING A COMMUNICATION SYSTEM

Ju.V. Donetskaya, Yu.A. Gatchin

ITMO University, St. Petersburg, Russia

DEVELOPMENT OF A MODULAR STRUCTURE FOR A DIGITAL PASSPORT OF AN ELECTRONIC PRODUCT AT INSTRUMENT-MAKING INDUSTRY ENTERPRISES

Sergey S. Dvornikov

Military Academy of Communications, Saint-Petersburg, Russia

Aleksandr F. Kriachko

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

Sergey V. Dvornikov

Military Academy of Communications, Saint-Petersburg, Russia

ANALYSIS OF STRUCTURAL DIFFERENCES OF SIGNALS FORMED IN THE BASIS OF FOURIER AND WAVELET FUNCTIONS

Sergey V. Dvornikov, Aleksandr F. Kriachko

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

Sergey S. Dvornikov

Military Academy of Communications, Saint-Petersburg, Russia

METHOD FOR DETECTING AND COMPENSATING FOR INTERFERENCE IN RADIO CONTROL CHANNELS OF ROBOTIC DEVICES USING FREQUENCY-SHIFT KEYING SIGNALS

Sergei E. Efimov, Nikita V. Stepanov, Andrey M. Turlikov

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

RESEARCH LORAWAN COLLIDE SIGNALS WITH USED SDR

Vladimir V. Egorov, Mikhail S. Smal

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

Mikhail L. Maslakov

Russian Institute for Power Radioengineering, Saint-Petersburg, Russia

COMMAND RADIOSIGNAL ENSEMBLE SYNTHESIS FOR AUTOMATED SYSTEMS

S.N. Eliseev

Moscow technical university of communications and informatics (MTUCI), Moscow, Russia

L.N. Trifonova

Povolzhskiy State University of Telecommunications and informatics (PSUTI), Samara, Russia

CHANNEL ESTIMATION OF THE 802.11P STANDARD IN HIGH-SPEED MOBILE ENVIRONMENTS

Gregory A. Ermolaev, Olesya V. Bolkhovskaya, Alexander A. Maltsev

Lobachevsky University, Nizhny Novgorod, Russia

**ADVANCED APPROACH FOR TX IMPAIRMENTS COMPENSATION
BASED ON SIGNAL STATISTICAL ANALYSIS AT THE RX SIDE**

V.G. Eryshov, D.V. Ilina

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

**MODEL OF THE INTEGRATED SYSTEM OF PROTECTION
OF INFORMATION SYSTEMS OF THE ORGANIZATION**

Ivan Fedorov

ITMO University, Saint-Petersburg, Russia

Sergey Bezzateev

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

Grigoriy Panin, Ivan Fedorov, Andrey Pimenov

ITMO University, Saint-Petersburg, Russia

**BLOCKCHAIN IN 5G NETWORKS: PERFORMANCE EVALUATION
OF PRIVATE BLOCKCHAIN**

A.A. Fominykh, M.N. Isaeva, A.A. Ovchinnikov, Member IEEE

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

**ABOUT CONSTRUCTING BLOCK PERMUTATION LDPC CODES FOR
CHANNELS WITH MEMORY**

D.V. Gadasin, A.V. Shvedov, O.G. Klygina

MTUCI, Moscow, Russia

I.V. Shulginov

Telesoft Ltd., Moscow, Russia

**ROUTING MANAGEMENT SYSTEM FORMATION FOR MACHINE-TO-
MACHINE INTERACTION IN A DECENTRALIZED ENVIRONMENT**

Yu.A. Gatchin, Ju.V. Donetskaya, V.I. Polyakov

ITMO University, St. Petersburg, Russia

**IMPLEMENTATION OF A DIGITAL PASSPORT FOR AN ELECTRONIC
PRODUCT AT AN ENTERPRISE**

B.G. Ibrahimov, Member, IEEE, M.H. Hasanov, Member, IEEE

Azerbaijan Technical University, Baku, Azerbaijan

F.H. Agayev, Member, IEEE

Azerbaijan State Oil University and Industry, Baku, Azerbaijan

**RESEARCH AND ANALYSIS COMPREHENSIVE INDICATORS EFFICIENCY
IN LINKS OF MULTISERVICE COMMUNICATION NETWORKS**

D.V. Ilina, V.G. Eryshov

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**ANALYTICAL MODEL OF ACTIONS OF THE INFORMATION SECURITY
VIOLATOR ON COVERT EXTRACTION OF CONFIDENTIAL INFORMATION
PROCESSED ON THE PROTECTED OBJECT**

Maria N. Isaeva

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**DETECTION TYPES OF STEGANOGRAPHIC ATTACKS BASED
ON SEMI-FRAGILE WATERMARKS USING MACHINE LEARNING**

Dmitriy K. Kim

School of Digital Technology, Narxoz University, Almaty, Kazakhstan

Georgi D. Georgiev

Center for Energy Solutions 3K Solar Corporation, Varna, Bulgaria

Kairat A. Bostanbekov

National Open Research Laboratory of Information and Space Technologies Satbayev

University, Almaty, Kazakhstan

Roman I. Lyssenko

SB Sberbank JSC, Almaty, Kazakhstan

Natalya V. Markovskaya

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**RENEWABLES INTEGRATION AND PROBABILISTIC INFORMATION
PROCESSING**

V.S. Kolomoitcev

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K.R. Kolomoytseva

ITMO University, St. Petersburg, Russia

**MONITORING THE EFFECTIVENESS OF THE USE OF MEANS
OF PROTECTION IN INFORMATION PROTECTION SYSTEMS**

Sergey V. Kozlov, Alexander P. Shabanov
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Russian Academy of Sciences, Moscow, Russia*

Alexander N. Kubankov
Moscow Technical University of Communications and Informatics, Moscow, Russia
**ON THE TRANSFORMATION OF RESEARCH DATA TRANSMISSION
PROCESSES IN THE DIGITAL PLATFORM**

Olga I. Krasilnikova
St. Petersburg State University of Aerospace Instrumentation, St. Petersburg, Russia
ESTIMATION OF SPACE DEPTH INTERVALS IN A STEREOSCOPIC IMAGE

Aleksandr F. Kriachko, Sergey V. Dvornikov
St. Petersburg State University of Aerospace Instrumentation, St. Petersburg, Russia
Sergey S. Dvornikov
Military Academy of Communications, Saint-Petersburg, Russia
**FORMATION OF SPECTRALLY EFFICIENT SIGNALS
BASED ON WAVELETS**

Oleg I. Kutuzov
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Russia*

Tatiana M. Tatarnikova, Ekaterina D. Poymanova
St. Petersburg State University of Aerospace Instrumentation, St. Petersburg, Russia
**SOME FEATURES OF THE IMPLEMENTATION OF THE PARETO
DISTRIBUTION IN THE SIMULATION OF FRACTAL QUEUING SYSTEMS**

Nikita Yu. Liberovskiy, Vladimir S. Priputin, Denis S. Chirov
MTUCI, Moscow, Russia
**USING BLIND SIGNAL SEPARATION IN THE TASK OF DETECTING
FSK SIGNALS**

A.E. Makarov, I.V. Ryabov, E.S. Kljuzhev
Volga State University of Technology, Yoshkar-Ola, Russia
DIRECT DIGITAL SYNTHESIS OF COMPLEX BROADBAND SIGNALS

Ivan V. Malygin, Sergei A. Belkov, Artem E. Khudiakov

Ural Federal University, Yekaterinburg, Russia

IDENTIFICATION OF THE INTERFERENCE TYPE THAT DAMAGES THE M-SEQUENCE IN THE RADIO CHANNEL USING A NEURAL NETWORK

V.S. Markovskii, A.A. Fominykh, N.V. Matveev

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SIMULATION OF AIR-TO-GROUND BASED ON CELLULAR NETWORK

V.F. Mikhailov, D.V. Vasilieva

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

RADIATION OF A CIRCULAR WAVEGUIDE THROUGH THERMAL PROTECTION WITH ALLOWANCE FOR SIDE WAVES

A.A. Ovchinnikov, Member, IEEE, A.A. Fominykh

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ABOUT SOME IRREGULAR DEGREE DISTRIBUTIONS OF LDPC CODES IN TWO-STATE CHANNELS

Igor A. Pastushok, Nikita A. Yankovskii

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ON DEPENDENT DISTRIBUTIONS OF APPEARANCE AND SERVICING OF CLAIMS IN THE M/M/1

Evgeny V. Potapov, Iuliia A. Polovneva, Andrey A. Skitev

National Research Nuclear University "MEPhI", Moscow, Russia

Alexey N. Hailov

LLC "OhT", Moscow, Russia

DEVELOPMENT AND IMPLEMENTATION OF UNIVERSAL VERIFICATION METHODOLOGY DRIVER FOR ANALOG TV SIGNAL

Ekaterina D. Poymanova, Tatiana M. Tatarnikova

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

THE PRINCIPLE OF DATA DISTRIBUTION OVER PHYSICAL DATA STORAGE

Oxana N. Romashkova, Member, IEEE

Russian Presidential Academy of National Economy and Public Administration (RANEPA), Moscow, Russia

Elena A. Bakhtiyarova

International University of information technologies, Almaty, Kazakhstan

Yulia M. Zaltzman,

Kazakh Academy of Transport and Communications named after M. Tynyshpayev, Almaty, Kazakhstan

ALGORITHMS FOR PROCESSING SPEECH SIGNALS IN TELECOMMUNICATIONS SYSTEMS OF THE RAILWAY INDUSTRY

T.V. Semenenko, L.A. Osipov

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

USING INFORMATION PROCESSES FOR THE SYNTHESIS OF NONLINEAR CONTROL SYSTEMS

A.B. Semenov

Moscow State University of Civil Engineering (MGSU) National Research University, Moscow, Russia

METHOD FOR DETERMINING THE LIMITING LENGTH OF THE LONG ETHERNET TWISTED PAIR CABLE CHANNEL

Victor Sergeev, Olesya Bolkhovskaya, Alexander Maltsev

Lobachevsky University, Nizhny Novgorod, Russia

A PRACTICAL APPROACH TO HYBRID BEAMFORMING FOR 5G WI-FI SYSTEMS

Alexander B. Sergienko, Polina V. Apalina

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NONCOHERENT RECEPTION OF SIGNALS IN FAST FADING RAYLEIGH CHANNEL USING GENERALIZED LIKELIHOOD RATIO TEST

Tatiana M. Tatarnikova, Ekaterina D. Poymanova

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LOAD MANAGEMENT IN COMPUTER NETWORKS AS A TOOL TO ENSURE THE QUALITY OF SERVICE DELIVERY

A.N. Trofimov, F.A. Taubin

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EVALUATION OF THE UNION BOUND USING CHARACTERISTIC FUNCTIONS FOR CODED TRANSMISSION OVER MEMORYLESS CHANNELS

M.A. Vaganov

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INFORMATION APPROACH TO ESTIMATION OF AN OPTICAL SPECTRAL DEVICE EFFICIENCY

G.V. Verkhova, S.V. Akimov

The Bonch-Bruевич Saint Petersburg State University of Telecommunications (SPbSUT), Saint-Petersburg, Russia

INTEGRATION OF LOCAL INTEROPERABLE CYBER ENVIRONMENTS OF VIRTUAL ORGANIZATIONS INTO A SINGLE CYBER-ENVIRONMENT OF A POST-INDUSTRIAL SOCIETY

V.A. Veselova, A.A. Ovchinnikov, Member, IEEE, A.M. Veresova

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ON THE QUESTION OF THE RESISTANCE OF CODE-BASED CRYPTOSYSTEMS TO MATRIX DENSITY REDUCTION ATTACKS

Zafar Yuldashev

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Aleksander Sergeev

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Natalia Nastueva

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IOMT TECHNOLOGY AS THE BASIS OF WEARABLE ONLINE MONITORS FOR SPACE DISTRIBUTED MONITORING SYSTEMS FOR PREGNANT WOMEN

3 JUNE (10:00 – 16:00)

**CHAPTER 6.
ELECTROMECHANICS AND CONTROL SYSTEMS**

E.M. Anodina-Andrievskaja

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

V.P. Ivanov

St. Petersburg State University of Aerospace Instrumentation;

St. Petersburg Federal Research Center of the Russian Academy of Sciences,

St. Petersburg, Russia

**NEW METHODS OF SYNTHESIS AND CALCULATION OF OPTIMAL
TERMINAL CONTROL**

O.M. Filonov, V.I. Satarova, L.V. Makarova

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

FAILURE ANALYSIS FOR AN UAV IN SAFE PATH PLANNING

Aydar R. Nasybullin, Gennady A. Morozov, Vladimir I. Anfinogentov,

Konstantin A. Lipatnikov

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Russia*

Sergey V. Smirnov

*Kazan Law Institute Ministry of Internal Affairs of the Russian Federation, Kazan,
Tatarstan, Russia*

**MULTI-SENSOR TEMPERATURE AND HUMIDITY MEASURING SYSTEM
FOR TECHNOLOGICAL PROCESS OF ORGANIC LIVESTOCK WASTE MI-
CROWAVE TREATMENT MONITORING**

I.V. Ryabov, N.V. Degtyarev, D.N. Bochcarev

Volga State University of Technology, Yoshkar-Ola, Russia

**FORMATION OF FREQUENCY-MODULATED SIGNALS USING
THE DIRECT DIGITAL SYNTHESIS METHOD**

Vladislav F. Shishlakov, Elizaveta Yu. Vataeva, Natalia V. Reshetnikova

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

**GENERAL SCHEME FOR SOLVING THE PROBLEM OF SYNTHESIS
OF NONLINEAR NON – STATIONARY AUTOMATIC CONTROL SYSTEMS
IN THE TIME DOMAIN**

Sergey V. Smirnov

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Kazan, Tatarstan, Russia*

Gennady A. Morozov, Vladimir A. Anfinogentov, Aydar R. Nasybullin,

Konstantin A. Lipatnikov

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Russia*

**MATHEMATICAL MODEL FOR TECHNOLOGICAL PROCESS
OF ORGANIC LIVESTOCK WASTE MICROWAVE TREATMENT
IN CONVEYOR INSTALLATION**

2 JUNE (10:00 – 16:00)

**CHAPTER 7.
MICROELECTRONIC EMBEDDED SYSTEMS**

Aleksandr A. Karandashev, Valentin L. Olenev

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

**SELECTION METHODS FOR DEADLOCK-FREE ROUTES' OPTIMAL
CONFIGURATION IN ON-BOARD SPACEWIRE NETWORKS**

V.L. Olenev, I.L. Korobkov, N.Y. Chumakova, N.I. Sinyov

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SANDS TOOL FOR DESIGN AND SIMULATION OF ONBOARD NETWORKS

K.N. Rozhdestvenskaya, V.L. Olenev

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ADDITIONAL APPROACHES FOR ONBOARD NETWORKS FDIR

Elena A. Suvorova

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

**AN APPROACH FOR DEVELOPMENT OF RISC-V BASED TRANSPORT
LAYER CONTROLLER**

Alexey Yu. Vinogradov, Elena A. Suvorova

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

**TIME SYNCHRONIZATION INFLUENCE ON THE SPACEFIBRE
QOS MECHANISMS**

Evgeny N. Yablokov

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

**ENCODING AND DECODING PRINCIPLES FOR CIVIL AVIATION
IN MODE S**

2 JUNE (10:00 – 16:00)

**CHAPTER 8.
MODELING AND SITUATIONAL QUALITY MANAGEMENT
IN ELECTRONICS AND INSTRUMENTATION**

V. I. Isakov, D. A. Shepeta

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

**SIMULATION OF LOCATION SIGNALS WHEN DETERMINING
A COASTAL EDGE**

Pavel A. Maksimov, Anton S. Ishkov, Maksim K. Markelov

Penza State University, Penza, Russia

**INFLUENCE OF TRANSMISSION LINE PARAMETERS
ON THE RELIABILITY OF A DIGITAL DEVICE**

Olga V. Opalikhina

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

DISCRETE MODEL OF CORRECTIVE SYSTEM

1 JUNE (10:00 – 16:00)

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

A.A. Dobrovolskaia

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

**RESEARCH THE APPLICATION OF DATA FROM UNMANNED SYSTEMS
FOR THE DEVELOPMENT OF MICROMOBILITY AND MODERNIZATION
OF URBAN INFRASTRUCTURE**

Mikhail Gorodnichev, Marina Moseva, Daniil Belousov

Moscow Technical University of Communications and Informatics, Moscow, Russia

**ARCHITECTURE DEVELOPMENT FOR A HIGH-LOAD VEHICLE
TRACKING APPLICATION**

O.A. Izotov

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

A.L. Kuznetsov

Admiral Makarov State University of Maritime and Inland Shipping, St. Petersburg

**MEASUREMENT MODELS FOR DETERMINING THE PLANNING HORIZONS
FOR THE DELIVERY OF COMBINED SHIPMENTS**

I.Y. Klass, V.S. Pavlov, E.L. Turnetskaya

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

**SIMULATION OF OPERATIONAL DIAGNOSTICS OF THE VEHICLE
BRAKE SYSTEM**

A.S. Kostin

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

**MODELS AND METHODS FOR IMPLEMENTING THE AUTOMOUS
PERFORMANCE OF TRANSPORTATION TASKS USING A DRONE**

Y.V. Litvinov

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A.B. Bushuev, E.Y. Litvinov

ITMO University, Saint-Petersburg, Russia

**GRAPHIC SYNTHESIS OF THE OPERATING PHYSICAL PRINCIPLE
OF CONTROL AND MEASURING DEVICES**

N.N. Maiorov

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**RESEARCH OF THE TRANSPORT TERMINAL POSITION BASED
ON THE ANALYSIS OF THE DIGITAL CIRCOS MODEL**

Peter Menshik, Igor Niesov, Sergey Erokhin, Anton Evsyukov, Mikhail Gorodnichev

Moscow Technical University of Communications and Informatics, Moscow, Russia

**USING MACHINE LEARNING ALGORITHMS IN PREDICTIVE
PSYCHODIAGNOSTICS**

Nguyen Thin Quynh, Mikhail G. Shatrov, Leonid N. Golubkov

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Moscow, Russia*

Andrey Y. Dunin, Pavel V. Dushkin

Ishlinsky Institute for Problems in Mechanics RAS, Moscow, Russia

**INFLUENCE OF INJECTION PRESSURE AND PRESSURE OSCILLATION
AND ON THE RATE OF FUEL OUTFLOW FROM THE SPRAYER
OF AN ELECTROHYDRAULIC DIESEL NOZZLE**

A.Zh. Radochinskaia, T.E. Malikova, A.Yu. Strelkov

Maritime State University named after Admiral G. I. Nevelskoi, Vladivostok, Russia

**PROVABILITY OF DANGEROUS GOODS SEGREGATION ALGORITHM
DESCRIPTION USING FINITE STATE-MACHINE DESCRIPTION LANGUAGE**

V.V. Rubinov, V.A. Fetisov

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

**PROBLEMS OF A MODERN APPROACH TO THE TECHNOLOGICAL
PROCESS OF WASTE MANAGEMENT**

Mikhail G. Shatrov, Vladimir V. Sinyavski, Andrey V. Vakulenko, Andrey Y. Dunin

*Moscow Automobile and Road Construction State Technical University (MADI), Moscow,
Russia*

**ANALYSIS OF INDICATOR AND EFFECTIVE PARAMETERS
OF AUTOMOTIVE AND LOCOMOTIVE GAS-DIESEL ENGINES
OPERATING IN SIMILAR MODES**

Y.A. Silin

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**DEVELOPMENT OF THE INFORMATION-MEASURING SYSTEM
TO MAINTAIN THE TEMPERATURE BALANCE INSIDE THE CONTAINER
DURING TRANSPORTATION**

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R.T. Khakimov

Saint Petersburg State Agrarian University, Saint-Petersburg, Russia

I.V. Belinskaia

Leningrad State University named after A.S. Pushkin, Saint-Petersburg, Russia

**IMPROVING THE ENERGY EFFICIENCY OF A GAS ENGINE USING
AN ELECTRONIC CONTROL SYSTEM**

**Oksana V. Tikhonenkova, Sergey A. Tsurkov, Anastasiia S. Danilova,
Timofey V. Sergeev**

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

**THE SYSTEM FOR DETERMINING POSITION, MOVEMENT
AND INCLINATION OF THE HUMAN HEAD FOR ORTHOPEDICS**

S.V. Ugolkov

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

**BASIC REQUIREMENTS FOR METROLOGICAL CHARACTERISTICS
OF TACHOGRAPHS**

E. A. Voznesenskii

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**AUTOMATED BATTERY CHARGING SYSTEM FOR MULTI-ROTOR
AERIAL VEHICLES**