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MOSCOW AUTOMOBILE AND ROAD CONSTRUCTION STATE TECHNICAL UNIVERSITY (MADI)  
INSTITUTE OF RADIO AND INFORMATION SYSTEMS (IRIS)  
MEDIA PUBLISHER LTD

**International Scientific Conference**

**«2024 INTELLIGENT TECHNOLOGIES  
AND ELECTRONIC DEVICES IN VEHICLE  
AND ROAD TRANSPORT COMPLEX»  
(TIRVED-2024)**

**(IEEE Conference # 63561)**

**13-15 November 2024**

**CONFERENCE PROGRAM**

**Moscow  
2024**

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IEEE REGION 8, RUSSIA SECTION CAS CHAPTER

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MOSCOW AUTOMOBILE AND ROAD CONSTRUCTION STATE TECHNICAL UNIVERSITY (MADI)

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## CONFERENCE CHAPTERS\*

**Chapter 1.** Advanced digital intelligent technologies, robotic and big data systems, machine learning and artificial intelligence

*(Передовые цифровые интеллектуальные технологии, роботизированные системы и системы больших данных, машинное обучение и искусственный интеллект)*

**Chapter 2.** Intelligent transport systems and monitoring the state of road network objects

*(Интеллектуальные транспортные системы и мониторинг состояния объектов дорожной сети)*

**Chapter 3.** Electronic driver assistance systems. Self-driving cars and electric vehicles

*(Электронные системы помощи водителю. Самоуправляемые автомобили и электромобили)*

**Chapter 4-5.** Advanced technologies and strategies for transportation systems

*(Автоматизированные транспортные средства, интеллектуальные методы управления и контроля)*

**Chapter 6.** Electrical and electronic engineering pedagogy

*(Инженерная педагогика в области электроники и электротехники)*

**Chapter 7.** Mathematical modeling of physical processes. Optical technologies and instrumentation

*(Математическое моделирование физических процессов. Оптические технологии и приборостроение)*

\* The reports in the program inside the sections are listed in alphabetical order by the name of the first author. By agreement with the chairman of the section, the order of reports may be changed

*(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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**Novikov I.A.**, *Doctor of Technical Sciences, Associate Professor, Director of the Transport and Technological Institute of BSTU named after V.G. Shukhov*

# CONFERENCE SCHEDULE

**13 November 2024**

**Lecture hall MADI (аудитория) 345**  
<https://telemost.yandex.ru/j/69505659374035>  
**10-00 – 14-00**

**Chapter 1. Advanced digital intelligent technologies, robotic and big data systems, machine learning and artificial intelligence**

**Section Chairman:** *M.V. Yashina, Doctor of Technical Sciences, Cand. physical-mat. Sciences, head. Department of “Higher Mathematics” MADI, Member, IEEE*

**Scientific and Technological Centre of Unique Instrumentation of the RAS**  
**10-00 – 18-00**

**Chapter 7. Mathematical modeling of physical processes. Optical technologies and instrumentation (Part I)**

**Section Chairmans:** *Vitold E. Pozhar, Doctor of Physical and Mathematical Sciences, Head of Department, Acousto-Optical Information Systems, Scientific and Technological Centre of Unique Instrumentation of the Russian Academy of Sciences*

*Vladimir N. Bely, Doctor of Physical and Mathematical Sciences, Academician of the National Academy of Sciences of Belarus, Head of the Diagnostic Systems Center, Institute of Physics*

**14 November 2024**

**Lecture hall MADI (аудитория) 502н**  
**10-00 – 15-00**

**Chapter 3. Electronic driver assistance systems. Self-driving cars and electric vehicles**

**Section Chairman:** *A.M. Ivanov, Doctor of Technical Sciences, professor, head. Department “Automobiles”, MADI*

**Lecture hall MADI (аудитория) 703л**  
**11-00 – 17-00**

**Chapter 4-5. Advanced technologies and strategies for transportation systems**

**Section Chairman:** *A.V. Ostroukh, Doctor of Technical Sciences, professor, MADI*

**Scientific and Technological Centre of Unique Instrumentation of the RAS**  
**10-00 – 18-00**

**Chapter 7. Mathematical modeling of physical processes. Optical technologies and instrumentation (Part II)**

**Section Chairmans:** *Vitold E. Pozhar, Doctor of Physical and Mathematical Sciences, Head of Department, Acousto-Optical Information Systems, Scientific and Technological Centre of Unique Instrumentation of the Russian Academy of Sciences*

*Vladimir N. Bely, Doctor of Physical and Mathematical Sciences, Academician of the National Academy of Sciences of Belarus, Head of the Diagnostic Systems Center, Institute of Physics*

**15 November 2024**

**Lecture hall MADI (аудитория) 132**  
**<https://telemost.yandex.ru/j/47341024416039>**  
**12-00 – 15-00**

**Chapter 2. Intelligent transport systems and monitoring the state of road network objects**

**Section Chairman:** **Yu.E. Vasiliev**, *Doctor of Technical Sciences, professor, head. Department “Road building materials” MADI*

**(VIRTUAL)**  
**<https://telemost.yandex.ru/j/20344214424145>**  
**15-00 – 18-00**

**Chapter 6. Electrical and electronic engineering pedagogy**

**Section Chairman:** **S.L. Yablochnikov**, *Doctor of Sciences, Professor, Plekhanov Russian University of Economics*

**November 13, 2024**  
**Lecture hall MADI (аудитория) 345**  
**<https://telemost.yandex.ru/j/69505659374035>**  
**10-00 – 14-00**

## CHAPTER 1

### ADVANCED DIGITAL INTELLIGENT TECHNOLOGIES, ROBOTIC AND BIG DATA SYSTEMS, MACHINE LEARNING AND ARTIFICIAL INTELLIGENCE

(ПЕРЕДОВЫЕ ЦИФРОВЫЕ ИНТЕЛЛЕКТУАЛЬНЫЕ ТЕХНОЛОГИИ, РОБОТИЗИРОВАННЫЕ СИСТЕМЫ И СИСТЕМЫ БОЛЬШИХ ДАННЫХ, МАШИННОЕ ОБУЧЕНИЕ И ИСКУССТВЕННЫЙ ИНТЕЛЛЕКТ)

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*Moscow Technical University of Communications and Informatics, Moscow, Russia*  
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*BRICS University (UNIBRICS), Moscow, Russia*

**DATASET ANNOTATION CONVERTER FOR TRAINING NEURAL NETWORKS TO DETECT DEFECTS ON VARIOUS SURFACES**

**2. Muataz Almohamed**

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

**UNIQUENESS IN LINEAR INVERSE PROBLEMS FOR AN ABSTRACT DIFFERENTIAL EQUATION OF THE SECOND ORDER**

**3. Nikita V. Belov, Liliya I. Voronova, Mariya V. Khokhlova**

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

**DEVELOPMENT OF A METHOD FOR ROBOTIC SORTING OF METAL OBJECTS**

**4. Irina Dobrynina**

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

**ON ONE ALGORITHM IN THE GENERALIZED ARTIN TREE GROUP**

**5. Yuri Leokhin, Timur Fatkhulin, Mikhail Kozhanov**

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

**RESEARCH OF NEURAL NETWORKS CHATGPT USED TO GENERATE CODE IN PYTHON PROGRAMMING LANGUAGE**

**6. S. V. Sokolov, D. V. Marshakov, I. V. Reshetnikova**

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**E. G. Chub**

*Rostov State University of Economics, Rostov-on-Don, Russia*

**METHOD FOR REGULARIZED ESTIMATION OF THE OPTICAL FLOW VELOCITY FIELD IN COMPUTER VISION SYSTEMS**

**7. Nikita Sheremet, Grigory Fokin**

*The Bonch-Bruевич Saint Petersburg State University of Telecommunications,  
Saint Petersburg, Russia*

**SOFTWARE-DEFINED RADIO WIRELESS COMMUNICATION TECHNOLOGY DESIGN. MIMO 4×4 MODE CONFIGURATION**

**8. Marina A. Trapeznikova**

*Keldysh Institute of Applied Mathematics of Russian Academy of Sciences (KIAM RAS),  
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*Moscow Automobile and Road Construction State Technical University (MADI);  
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Institute (National Research University), Moscow, Russia*

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

**SOFTWARE FOR VISUALIZATION OF CELLULAR AUTOMATA MODELS IN TRAFFIC FLOW ANALYSIS**

**9. M. V. Yashina**

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

*Moscow Aviation Institute (Research University);*

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

**Ya. A. Akilin, V. V. Osada, A. F. Smyk**

*Moscow Automobile and Road Construction State Technical University, Moscow, Russia*

**VEHICLE TRACKING ALGORITHM OF SPEED ESTIMATION BASED ON TRAFFIC VIDEO ANALYSIS**

**November 15, 2024**  
**Lecture hall MADI (аудитория) 132**  
**<https://telemost.yandex.ru/j/47341024416039>**  
**12-00 – 15-00**

**CHAPTER 2**  
**INTELLIGENT TRANSPORT SYSTEMS AND MONITORING**  
**THE STATE OF ROAD NETWORK OBJECTS**

**(ИНТЕЛЛЕКТУАЛЬНЫЕ ТРАНСПОРТНЫЕ СИСТЕМЫ И МОНИТОРИНГ СОСТОЯНИЯ**  
**ОБЪЕКТОВ ДОРОЖНОЙ СЕТИ)**

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**DETERMINING THE TIME AND VOLUME OF SUPPLY OF MATERIALS**  
**FOR THE PRODUCTION OF ASPHALT CONCRETE MIXTURES**

**2. Alexander A. Butrinov**

*State Budgetary Institution of the City of Moscow "Automobile Roads", Moscow, Russia*

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*"MADiDT", Moscow, Russia*

**Yuri E. Vasiliev, Maria A. Brezhneva, Peter I. Lykashchuk**

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

**ASSESSMENT OF THE IMPACT OF MATERIALS AND PRODUCTION**  
**TECHNOLOGY ON THE DURABILITY OF ASPHALT CONCRETE**  
**STRUCTURAL LAYERS OF ROAD CLOTHING**

**3. Pavel V. Plotnikov, Gleb I. Tambovtsev, Andrey G. Vladyko**

*The Bonch-Bruевич Saint-Petersburg State University of Telecommunications,*  
*Saint Petersburg, Russia*

**EVALUATING THE PERFORMANCE OF USING MOBILE ROADSIDE UNITS**  
**FOR TASK OFFLOADING IN V2X SYSTEMS**



**4. Kirill E. Shugaev, Peter I. Lykashchuk, Alexei A. Tsesar**

*Small Innovative Enterprise "Monitoring of Roads and Road Technologies" SIE "MADiDT", Moscow, Russia*

**Maxim M. Nikitaev, Georgy Sh. Malazoni**

*State Budgetary Institution of the City of Moscow "Automobile Roads", Moscow, Russia*

**INTELLIGENT ROAD SURFACE REPAIR PLANNING**

**5. Alena Shviatsova, Vasily Shuts**

*Brest State Technical University, Brest, Belarus*

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**Haiwei Wang, Chengtao Cao**

*School of Smart Transportation Engineering Guangdong Communication Polytechnic, Guangzhou, China*

**MANAGEMENT PRINCIPLES IN INTELLIGENT PASSENGER  
TRANSPORTATION SYSTEM**

**6. Alexei A. Tsesar, Sergey V. Varshavskiy, Kirill E. Shugaev**

*Small Innovative Enterprise "Monitoring of Roads and Road Technologies" SIE "MADiDT", Moscow, Russia*

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*State Budgetary Institution of the City of Moscow "Automobile Roads", Moscow, Russia*

**Kirill A. Barinov**

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

**METHODOLOGY FOR TRAINING A NEURAL NETWORK  
FOR RECOGNIZING ROAD PAVEMENT DEFECTS**

**7. Sergey V. Varshavskiy, Alexei A. Tsesar**

*Small Innovative Enterprise "Monitoring of Roads and Road Technologies" SIE "MADiDT", Russia, Moscow*

**Yuri E. Vasiliev, Gennady G. Yagudaev, Maria A. Brezhneva**

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

**SYSTEM FOR MEASURING THE TRANSVERSE FLATNESS  
OF THE ROADWAY**

**November 14, 2024**  
**Lecture hall MADI (аудитория) 502н**  
**10-00 – 15-00**

**CHAPTER 3**  
**ELECTRONIC DRIVER ASSISTANCE SYSTEMS. SELF-DRIVING CARS**  
**AND ELECTRIC VEHICLES**

**(ЭЛЕКТРОННЫЕ СИСТЕМЫ ПОМОЩИ ВОДИТЕЛЮ. САМОУПРАВЛЯЕМЫЕ**  
**АВТОМОБИЛИ И ЭЛЕКТРОМОБИЛИ)**

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**1. T. V. Chernysheva, O. B. Popov, V. A. Abramov, P. S. Sapronov**  
*Moscow Technical University of Communications and Informatics, Moscow, Russia*  
**FEATURES OF SPECTRAL ANALYSIS USING COMPLEX DISCRETE COSINE**  
**TRANSFORM**

**2. Ph. K. Dyakov, A. N. Andreev, M. A. Toporkov, M. I. Alexeenkov, E. P. Dyakov**  
*Moscow Automobile and Road Construction State Technical University (MADI), Moscow,*  
*Russia*  
**PRACTICAL ASPECTS OF ELECTRICAL VEHICLE USAGE ON CURRENT**  
**CONDITION**

**3. Vitalij V. Gaevskij, Andrey M. Ivanov, Irina V. Odinkova**  
*Moscow Automobile and Road Construction State Technical University (MADI), Moscow,*  
*Russia*  
**DEVELOPMENT OF A SYSTEM FOR PREVENTION OF COLLISIONS**  
**OF MICROTRANSPORTS WITH PEDESTRIANS**

**4. Andrey M. Ivanov**  
*Moscow Automobile and Road Construction State Technical University (MADI), Moscow,*  
*Russia*  
**Daria A. Makarova, Sergey S. Shadrin**  
*The Advanced Engineering School of Electric transport Moscow Polytechnic University,*  
*Moscow, Russia*  
**EVALUATING THE OPERATIONAL SAFETY OF A PASSENGER CAR**  
**AUTOMATIC EMERGENCY BRAKING SYSTEM**

**5. Maria. Yu. Karelina**

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*Institute of Mechanical Engineering, Energy and Transport Vologda State University,*

*VOGU, Vologda, Russia*

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*State University of Management, Moscow, Russia*

**COMPARATIVE ANALYSIS OF THE EFFICIENCY OF USING A DIESEL AND ELECTRIC LOADER TAKING INTO ACCOUNT THE RESOURCE LIMITATIONS OF THE BATTERY**

**6. S. R. Kristalnyi**

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**CONCEPT OF PASSIVE AND POST-ACCIDENT PART ASSESSMENT FOR NON-COMMERCIAL VEHICLES INTEGRATED SAFETY DESIGN**

**7. Daria A. Makarova, Sergey S. Shadrin, Yury M. Furletov**

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

*The Advanced Engineering School of Electric transport Moscow Polytechnic University,*

*Moscow, Russia*

**Andrey M. Ivanov**

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

**DEVELOPMENT OF METHODS FOR MONITORING AND PREDICTING THE SAFETY OF AUTOMATED VEHICLES IN OPERATION**

**8. Oleg B. Popov, Kirill A. Korostelev, Tatiana V. Chernysheva, Kirill V. Orlov**

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

**REDUCTION OF THE TRANSMISSION RATE OF SOUND BROADCASTING SIGNALS BASED ON THEIR MODULATION REPRESENTATION**

**9. N. V. Popov, V. V. Gaevskiy, A. N. Andreev, Ph. K. Dyakov, I. F. Endrukhin**

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

**EXPERIMENTAL DETERMINATION OF THE EFFECTIVENESS OF THE LANE SUPPORT SYSTEM**

**10. Petr I. Smirnov**

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**Vera V. Silakova**

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**ESTIMATION OF ENERGY CONSUMPTION ON URBAN ACCESS ROADS USING THE TWO-FLUID MODEL**

**11. Boris S. Subbotin**

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*State University of Management, Moscow, Russia*

**Petr I. Smirnov**

*Institute of Mechanical Engineering, Energy and Transport Vologda State University, VOGU, Vologda, Russia*

**METHODOLOGY FOR DETECTING ANOMALOUS TRAFFIC FLOWS IN THE NETWORK BASED ON THE HURST PARAMETER**

**12. M. A. Toporkov, Ph. K. Dyakov, A. N. Andreev, M. I. Alexeenkov**

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

**FORECASTING THE TRAFFIC SITUATION AS A POSSIBLE WAY TO IMPROVE THE EFFECTIVENESS OF ADAS IN URBAN ENVIRONMENT**

**November 14, 2024**  
**Lecture hall MADI (аудитория) 703л**  
**11-00 – 18-00**

**CHAPTER 4-5**  
**ADVANCED TECHNOLOGIES AND STRATEGIES**  
**FOR TRANSPORTATION SYSTEMS**

**(АВТОМАТИЗИРОВАННЫЕ ТРАНСПОРТНЫЕ СРЕДСТВА,  
ИНТЕЛЛЕКТУАЛЬНЫЕ МЕТОДЫ УПРАВЛЕНИЯ И КОНТРОЛЯ)**

**CHAIRMEN: A.V. Ostroukh, *Doctor of Technical Sciences, professor, MADI***

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*Moscow Automobile and Road Construction State Technical University (MADI), Moscow, Russia*  
**MULTI-CRITERIA ANALYSIS OF GENETIC ALGORITHM APPLICATIONS  
IN TRANSPORTATION LOGISTICS**

**2. N. G. Kuftinova, A. V. Ostroukh, O. I. Maksimychev, C. B. Pronin**  
*Moscow Automobile and Road Construction State Technical University (MADI), Moscow, Russia*  
**I. A. Ostroukh**  
*Moscow State University of Geodesy and Cartography (MIIGAiK), Moscow, Russia*  
**EFFICIENT MACHINE LEARNING METHODS FOR REAL-TIME  
TRANSPORT SYSTEM OPTIMIZATION AND PREDICTIVE MAINTENANCE**

**3. V. S. Moskvina**  
*ITMO University, St. Petersburg*  
**QUANTUM BLOCKCHAIN ARCHITECTURE FOR TRANSPORTATION  
SERVICES**

**4. A. V. Ostroukh, N. G. Kuftinova, A. M. Borzenkov, A. A. Podberezkin**  
*Moscow Automobile and Road Construction State Technical University (MADI), Moscow, Russia*  
**I. A. Ostroukh**  
*Moscow State University of Geodesy and Cartography (MIIGAiK), Moscow, Russia*  
**RESEARCH ON USING DEEP LEARNING FOR TRANSPORT DEMAND  
PREDICTION**

**5. Maxim G. Pletnev, Alexey A. Akulov, Dmitry S. Taldykin**

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**Alexey G. Zaitsev**

*Moscow Automobile and Road Construction State Technical University (MADI), Moscow, Russia;  
Oryol State University named after I. S. Turgenev, Oryol, Russia*

**DETERMINATION OF TRAFFIC FLOW PARAMETERS USING  
HIGH-PRECISION POSITIONING SYSTEM TO IMPROVE TRAFFIC  
EFFICIENCY AND SAFETY**

**6. Pavel I. Pospelov**

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Oryol State University named after I. S. Turgenev, Oryol, Russia*

**SERVICE MODEL OF MEGALOPOLIS TRAFFIC FLOW MANAGEMENT**

**7. C. B. Pronin, A. A. Podberezkin, A. M. Borzenkov**

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

**EVALUATING CONSISTENCY OF IMAGE GENERATION MODELS WITH  
VECTOR SIMILARITY**

**8. A. I. Vorobyev**

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

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*Nizhny Novgorod State Technical University n. a. R. E. Alekseev (NNSTU),  
Nizhniy Novgorod, Russia*

**DEVELOPMENT OF A PEDESTRIAN TARGET FOR TESTING DRIVER  
ASSISTANCE SYSTEMS**

**9. S. V. Zhankaziev, V. V. Dronseiko, A.M. Merkovich, Yu. A. Korotkova,  
A. V. Zamytskih**

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

**MESODYNAMIC MODEL OF CONFLICT IN TRAFFIC FLOW**

**November 15, 2024**  
**(VIRTUAL)**  
<https://telemost.vandex.ru/j/20344214424145>  
**15-00 – 18-00**

## CHAPTER 6

### ELECTRICAL AND ELECTRONIC ENGINEERING PEDAGOGY

(ПЕДАГОГИКА В ОБЛАСТИ ЭЛЕКТРОТЕХНИКИ И ЭЛЕКТРОННОЙ ИНЖЕНЕРИИ)

**CHAIRMEN:** **S. L. Yablochnikov**, *Doctor of Sciences, Professor,*  
*Plekhanov Russian University of Economics*

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**Maya Kerimova**, *Azerbaijan State University of Oil and Industry, Baku, Azerbaijan*

**Sergey Yablochnikov**, *Plekhanov Russian University of Economics, Moscow, Russia*

**CONTROL SYSTEM FOR OPERATING MODES OF FIBER LEAD BENDING FORMERS**

**2. A. Y. Kudryashova, N. E. Poborchaya, I. S. Kretova**

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

**APPLICATION OF STUDENTS' SCIENTIFIC POTENTIAL**

**TO MODERNIZATION OF LABORATORY WORK COMPLEX**

**3. T. A. Kuzovkova, O. I. Sharavova, M. M. Sharavova**

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

**THE CAUSES AND SOURCES OF THE EVOLUTION OF ENGINEERING**

**EDUCATION COMPETENCIES IN THE FIELD OF ELECTRONICS**

**AND COMMUNICATIONS**

**4. Tofiq Mansurov**, *Azerbaijan Technical University, Baku, Azerbaijan*

**Sakina Abbasova, Maya Kerimova**

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**Sergey Yablochnikov**, *Plekhanov Russian University of Economics, Moscow, Russia*

**Irina Yablochnikova**

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**METHOD OF ONLINE CONTROL OF DETONATION PROPERTIES OF HYDROCARBON FUELS**

**5. A. M. Raitsin, A. R. Lakernik**

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**EDUCATIONAL AND METHODOLOGICAL COMPLEX IN HIGHER  
MATHEMATICS FOR STUDENTS OF TECHNICAL SPECIALTIES**

**6. Tatyana Y. Salutina, Galina P. Platunina, Irina A. Frank**

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

**THE ROLE OF ARTIFICIAL INTELLIGENCE IN IMPROVING  
THE EFFECTIVENESS OF PROFESSIONAL TRAINING OF STUDENTS  
OF ELECTRICAL ENGINEERING AND ELECTRONIC ENGINEERING**

**7. Nataliya Solovyeva**

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

**USING SPECIALIZED CORPORA IN TEACHING ENGLISH FOR SPECIFIC  
PURPOSES TO STUDENTS OF POSGRADUATE ENGINEERING PROGRAM**

**8. Natalia V. Toutova, Iliya A. Andreev**

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**Alexandra P. Gaeva**

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**Vladimir L. Agamirov, Levon V. Agamirov**

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**BLOCKCHAIN IN EDUCATION: A NEW APPROACH TO STORING  
AND VERIFICATION OF ACADEMIC WORKS**



**November 13, 2024**  
**Scientific and Technological Centre of Unique Instrumentation of the RAS**  
**Part I**

**10-00 – 18-00**

**CHAPTER 7**  
**MATHEMATICAL MODELING OF PHYSICAL PROCESSES.**  
**OPTICAL TECHNOLOGIES AND INSTRUMENTATION**

**(МАТЕМАТИЧЕСКОЕ МОДЕЛИРОВАНИЕ ФИЗИЧЕСКИХ ПРОЦЕССОВ.**  
**ОПТИЧЕСКИЕ ТЕХНОЛОГИИ И ПРИБОРОСТРОЕНИЕ)**

**CHAIRMENS:** **Vitold E. Pozhar**, *Doctor of Physical and Mathematical Sciences, Head of Department, Acousto-Optical Information Systems, Scientific and Technological Centre of Unique Instrumentation of the Russian Academy of Sciences*  
**Vladimir N. Bely**, *Doctor of Physical and Mathematical Sciences, Academician of the National Academy of Sciences of Belarus, Head of the Diagnostic Systems Center, Institute of Physics*

**1. T. D. Balandin, D. V. Chernov**

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**IMPROVING THE ACCURACY OF ACOUSTIC EMISSION SOURCES LINEAR LOCATION BASED ON CONSTRUCTING THE ACOUSTIC SIGNAL ENVELOPE VIA THE HILBERT TRANSFORM**

**2. V. N. Belyi, N. S. Khilo, P. K. Petrov**

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

**PECULIARITIES OF PROPAGATION OF ANNULAR AND LAGUERRE-GAUSSIAN BEAMS IN THE ATMOSPHERE**

**3. S. M. Bobrovnikov, E. V. Gorlov, V. I. Zharkov**

*Centre of Laser Sounding of the Atmosphere V.E. Zuev Institute of Atmospheric Optics SB RAS, Tomsk, Russia*

**SPECTRAL SELECTION SYSTEM OF NARROW BAND RADIATION OF THE EXCIMER KRF LASER**

**4. V. A. Bogatyrev**

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

**V. S. Moskvin**

*ITMO University, St. Petersburg, Russia*

**OPTIMIZING TRAFFIC FLOW USING QUANTUM ANNEALING**

**5. Alexey Bykov, Demid Khokhlov, Mikhail Polyakov**

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**SPECTRAL THERMOGRAPHY TECHNIQUES FOR MELT POOL THERMAL IMAGING IN ELECTRON BEAM ADDITIVE MANUFACTURING**

**6. Dmitry V. Churikov, Maksim V. Grachev, Igor A. Stupin**

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

**RESTORATION OF THE IMPULSE PROFILE IN THE REMOTE MONITORING SYSTEM OF TECHNICAL FACILITIES**

**7. Oleg D. Demekhin, Pavel S. Plyaka**

*Laboratory of Applied Scientific Instrumentation Federal Research Centre The Southern Scientific Centre of the Russian Academy of Sciences, Rostov-on-Don, Russia*

**DEVELOPMENT OF A CHEMOSENSOR FOR MEASURING AMMONIA CONCENTRATION DISSOLVED IN WATER**

**8. D. A. Denisov, D. Yu. Demushkin**

*Optical Materials Metrology Laboratory of NTO IRE-Polus, Fryazino, Russia*

**MEASUREMENT OF OPTICAL QUALITY PARAMETERS OF CRYSTALLINE LITHIUM-SODIUM MOLYBDATE**

**9. D. V. Gerasin, E. O. Bryanskaya, V. V. Dremin, A. V. Dunaev**

*Research and Development Center of Biomedical Photonics Orel State University, Orel, Russia*

**THE USE OF CONVOLUTIONAL NEURAL NETWORKS TO CLASSIFY THE STATES OF THE MAXILLARY SINUSES IN DIGITAL DIAPHANOSCOPY**

**10. I. S. Chulkov, A. L. Goncharov, Kh. M. Kozyrev, V. S. Fadeev**

*National Research University «Moscow Power Engineering Institute», Moscow, Russia*

**INVESTIGATION OF THERMOPOWER OF PURE METALS AND STRUCTURAL MATERIALS AT HIGH TEMPERATURES AIMED TO SIMULATE ELECTRON BEAM WELDING OF DISSIMILAR MATERIALS**

**11. A. L. Goncharov, I. S. Chulkov, Kh. M. Kozyrev, V. S. Fadeev**

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**APPLICATION OF MACHINE LEARNING METHODS TO SOLVE THE PROBLEM OF CLASSIFYING MATERIALS BASED ON THE RESULTS OF MEASURING THEIR THERMOELECTRIC POWER**

**12. Maksim Grachev**

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**METHODS AND ALGORITHMS FOR VISUALIZING THE VOLUMETRIC MODEL OF AN OBJECT BASED ON ITS VISIBLE PART**

**13. P. A. Grishaev, K. M. Bulatov, P. V. Zinin**

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**RAPID DETERMINATION OF TEMPERATURE DISTRIBUTION IN DIAMOND ANVIL CELLS FROM MULTISPECTRAL CAMERA IMAGES BY FULLY CONNECTED NEURAL NETWORK**

**14. Dmitry S. Gubsky, Sergey V. Krutiev, Irina N. Ivanova, Svetlana A. Vyatkina**

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**VIRTUAL RADIOPHYSICS LABORATORY**

**15. Ildus Sh. Khasanov, Tatyana V. Blagova**

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**OPTIMIZATION OF COMPRESSIVE GHOST IMAGING IN THE TERAHERTZ RANGE USING CORRELATION-BASED RANKING IN OPTICAL SYSTEM TRANSMISSION**

**16. Aleksandr I. Khorokhorin**

*Scientist in Chief of Infra Red Spectroscopy Department NTC UI RAS, Moscow, Russia*

**Vasily A. Vagin**

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**DATA ACQUISITION SYSTEM FOR MULTICHANNEL FOURIER SPECTROMETER**

**November 14, 2024**  
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**FEATURES OF METHODS FOR MODIFYING CANTILEVERS FOR ATOMIC FORCE MICROSCOPY**

**2. G. V. Kulak**  
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**V. I. Kazakov, O. V. Shakin**  
*Saint-Petersburg State University of Aerospace Instrumentation (SUAI), St. Petersburg, Russia*

**ACOUSTO-OPTICAL SPECTROANALYZER ON AZIMUTHALLY INHOMOGENEOUS BESSEL LIGHT BEAMS**

**3. D. Yu. Kuznetsova**  
*Optical Materials Metrology Laboratory STA IRE-Polus, Fryazino, Russia*

**V. A. Vagin**  
*Infrared Spectroscopy Department STC UI RAS, Moscow, Russia*  
**ATTENUATED TOTAL REFLECTION FIBER PROBES FOR REAL-TIME MEASUREMENTS IN THE MID-INFRARED RANGE**

**4. Oleg S. Litvinov, Aleksandr N. Zabelin, Klavdia M. Koroleva, Vsevolod V. Sivakov**

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**PRACTICAL APPLICATION POSSIBILITY OF HOLOGRAPHIC ANTENNAS FOR ADAPTIVE SIGNAL PROCESSING**

**5. Valeriy V. Malyy, Igor Y. Kinzhagulov, Vladimir E. Prokhorovich**

*ITMO University, Saint-Petersburg, Russia*

**AUTOMATION OF ULTRASONIC TESTING TECHNOLOGY FOR SOLDERED JOINTS OF HEAT EXCHANGER ELEMENTS**

**6. P. A. Mikhalev, B. A. Parshin, S. Y. Hydyrova, K. M. Moiseev, A. S. Voronin**

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**STUDY OF THE INFLUENCE OF SUBSTRATE MATERIAL AND THICKNESS OF INDIUM TIN OXIDE COATINGS ON THEIR OPTOELECTRONIC CHARACTERISTICS**

**7. Ramil A. Nezhmetdinov**

*Computer Control Systems department Moscow State Technology University "STANKIN", Moscow, Russia*

**Alexey D. Chudnovsky, Damir T. Bautdinov, Dilshod D. Yusupov, Vladimir V. Bogdanov**

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**CALCULATION OF NATURAL VIBRATION FREQUENCIES OF A BOX STRUCTURE WITH THERMAL PROTECTION.**

**8. Dmitry V. Nikitin**

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**Vladimir V. Bogdanov, Damir T. Bautdinov, Andrey A. Aleshkin**

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**FORCED TRANSVERSE VIBRATIONS OF A BOX STRUCTURE FROM THE ACTION OF A PLANE SHOCK WAVE, BASED ON A FLEXIBLE PLATE MODEL**

**9. Pavel A. Nikitin, Vitold E. Pozhar**

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**ON THE ELASTO-OPTIC CONSTANTS OF LINEAR ISOTROPIC DIELECTRICS**

**10. B. A. Parshin, M. O. Makeev, P. A. Mikhalev**

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**STRUCTURAL AND MORPHOLOGICAL ANALYSIS OF DIAMOND-LIKE CARBON COATINGS DEPOSITED USING DIFFERENT METHODS**

**11. I. A. Pimenova, I. A. Matveeva**

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**IDENTIFICATION OF BLOOD SERUM COMPOUND BY DECOMPOSITION OF RAMAN SPECTRA BY MULTIVARIATE CURVE RESOLUTION METHOD**

**12. Vitold Pozhar**

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**OPTICAL POLYSPECTRAL IMAGING SYSTEMS. CLASSIFICATION.**

**13. Andrey Preobrazhenskiy, Tatyana Avetisyan, Yuriy Preobrazhenskiy, Nikita Marenkov**

*Voronezh Institute of High Technologies Voronezh, Russia*

**EVALUATION OF ELECTROMAGNETIC WAVE PROPAGATION CHARACTERISTICS IN WIRELESS COMMUNICATION SYSTEMS**

**14. Vyacheslav A. Sokurenko, Yuri V. Sakharov**

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

**NON-DESTRUCTIVE TESTING OF RESISTIVE COMPONENTS USING LOW-FREQUENCY NOISE MEASUREMENT**

**15. Ksenia Tomnikova, Irina Matveeva**

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**APPLICATION OF MULTIVARIATE CURVE RESOLUTION ANALYSIS AND MULTILAYER PERCEPTRON FOR CLASSIFICATION OF RAMAN SPECTRA OF THE SKIN**

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**Stepan A. Krasnikov, Russian Technology University MIREA – RTU, Moscow, Russia**

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**SPECTRAL DATA FILTERING TO INCREASE ITS DISCRIMINATIVE POWER**