

# **2023 Applied Mathematics, Computational Science and Mechanics: Current Problems (AMCSM 2023)**

**Voronezh, Russia  
1 – 3 July 2023**



**IEEE Catalog Number: CFP23US9-POD  
ISBN: 979-8-3503-4858-3**

**Copyright © 2023 by the Institute of Electrical and Electronics Engineers, Inc.  
All Rights Reserved**

*Copyright and Reprint Permissions:* Abstracting is permitted with credit to the source. Libraries are permitted to photocopy beyond the limit of U.S. copyright law for private use of patrons those articles in this volume that carry a code at the bottom of the first page, provided the per-copy fee indicated in the code is paid through Copyright Clearance Center, 222 Rosewood Drive, Danvers, MA 01923.

For other copying, reprint or republication permission, write to IEEE Copyrights Manager, IEEE Service Center, 445 Hoes Lane, Piscataway, NJ 08854. All rights reserved.

***\*\*\* This is a print representation of what appears in the IEEE Digital Library. Some format issues inherent in the e-media version may also appear in this print version.***

IEEE Catalog Number:	CFP23US9-POD
ISBN (Print-On-Demand):	979-8-3503-4858-3
ISBN (Online):	979-8-3503-4857-6

**Additional Copies of This Publication Are Available From:**

Curran Associates, Inc  
57 Morehouse Lane  
Red Hook, NY 12571 USA  
Phone: (845) 758-0400  
Fax: (845) 758-2633  
E-mail: [curran@proceedings.com](mailto:curran@proceedings.com)  
Web: [www.proceedings.com](http://www.proceedings.com)

## TABLE OF CONTENTS

Developing Information Model of Blood Pressure Estimation .....	1
<i>Gennady Abramov</i>	
The Multicriteria Analysis Efficiency Method of Group Monitoring System Based on Unmanned Aerial Vehicles.....	6
<i>Alexander V. Ananев, Kirill S. Ivannikov, Dmitrii G. Pantenkov</i>	
Predicting the Optical Power of Intraocular Lenses by Means of Dynamically Developing Artificial Intelligence System .....	11
<i>Alexander A. Arzamastsev, Oleg L. Fabrikantov, Natalia A. Zenkova, Sergey V. Belikov</i>	
ARIMA–LSTM Method for Predicting Natural Systems Patterns using Genetic Algorithms .....	16
<i>Dmitriy Borisov, Alexander Chistyakov</i>	
The Effect of the Combination of Basis and Functional on the Results of DFT-Calculation of Atomic Structure of Silicon-Hafnium Anionic Clusters.....	20
<i>Nadezda Borshch, Natalia Pereslavtseva, Sergei Kurganskii, Ekaterina Maksimova</i>	
Computer DFT-Experiment to Study the Possibility of the Existence of Anionic “Superatoms” MeSn <sub>n</sub> – (Me=Sc, Y, La; n=12, 16, 20) .....	27
<i>Nadezda Borshch, Natalia Pereslavtseva, Sergei Kurganskii, Ekaterina Maksimova</i>	
Investigation of the Error of Two-Dimensional Fast Trigonometric Interpolation .....	33
<i>Alexander Chernyshov, Vitaly Goryainov, Sergey Kuznetsov, Elena Kovaleva</i>	
Brute-Force Integer Max Flow Algorithm for Networks Under Reachability Restrictions.....	40
<i>Iakov Erusalimskiy, Vladislav Rusakov</i>	
Application of Virtual Antenna Arrays Technology to Minimize the Influence of Soil Characteristics on the Direction-Finding Quality .....	43
<i>Evgeniy A. Ishchenko, Oleg Yu. Makarov, Yury G. Pasternak, Sergey M. Fedorov</i>	
Reflective Phase Shifter Based on Active Metamaterial .....	47
<i>Evgeniy A. Ishchenko, Yury G. Pasternak, Vladimir A. Penduyrin, Sergey M. Fedorov</i>	
Search for Clinical Entities Associated with Atherosclerosis using Methods of Natural Language Processing.....	50
<i>Irina Kashirina, Maria Demchenko</i>	
Medication Adherence in Cardiovascular Disease using Machine Learning Methods.....	55
<i>Irina Kashirina, Maria Firyulina</i>	
Simulation of the Conflict of the Opposing Sides in the Conditions of the Introduction of Hybrid Warfare with the Use of Cyber Weapons.....	60
<i>Mikhail Dobryshin, Sergei Kochedykov, Alexander Lukyanov, Evgeniy Grechishnikov, Alexander Dushkin</i>	
An Approach to Formation of Indicators for Assessing the Quality of Information Infrastructure Software Under the Conditions of the Destructive Impact of Cyber Attacks .....	65
<i>Sergey Kochedykov, Alexander Dushkin, Sergey Kobzistyy, Evgeniy Grechishnikov</i>	

Features in Aerodynamic Characteristics and Flow Structures Around an Aircraft with Perforated Stabilizing Devices.....	70
<i>Aleksandr Lutsenko, Maria Kalugina, Dinara Nazarova, Dmitriy Slobodyanyuk</i>	
Threshold Wavelet Filtering of Images Based on Weight Model .....	76
<i>Maya Lyasheva, Stella Lyasheva, Mikhail Shleymovich</i>	
About the Formation of Polygonal Structures Over the Rotating Disk .....	81
<i>Fedor A. Maksimov</i>	
A Model for Selecting a Seller's Offer on a Marketplace in a Competitive Environment .....	86
<i>Mikhail Matveev, Natalia Alejnikova, Maria Titova</i>	
Conditions of Application of the Modified Least Square Method for Models Identification of Distributed Dynamic Systems .....	91
<i>Mikhail Matveev, Ekaterina Sirota</i>	
Organization of Storage and Processing of Results from Industrial and Computational Experiments of Polymerization Processes Based on Databases .....	95
<i>Tatiana Mikhailova, Eldar Miftakhov, Svetlana Mustafina, Semen Podvalny</i>	
Identification and Accounting of Aperiodic Anomalies in Time Series with Cyclic Components .....	101
<i>Valeriya Morozova, Valery Menshikh</i>	
Applied Aspects of Number Theory .....	106
<i>Olga Victorovna Opalkhina</i>	
Detecting Graphic Objects using an Artificial Neural Network .....	113
<i>Alexander Parshin, Artemiy Kalashnikov, Vladimir Barabanov, Sergey Kenin</i>	
Computer Decision Support System for Resource-Saving Polymer Extrusion Design Based on Virtual Models.....	117
<i>Andrey Polosin, Tamara Chistyakova</i>	
Phase Trajectories of Linear Homogeneous Autonomous Dynamical Systems of the Third Order .....	126
<i>Artur Puntus, Alexey Fedyushkin</i>	
Absorption of the Electromagnetic Radiation of the Pyrolyzed Polyacrylonitrile: Model in the 1 to 3 GHz Frequency Range .....	132
<i>Daniil Radchenko, Irina Zaporotskova, Lev Kozhitov</i>	
Forecasting by using the Bayesian Belief Network of the Activation and Probable Consequences of Hazardous Natural Processes.....	136
<i>Viktoriya N. Taran</i>	
Optimal Cybersecurity Management of an IP Video Surveillance System.....	142
<i>Evgeniya Tsarkova</i>	
Software Tool for Creating Semantic Models for the Russian Language.....	145
<i>Ekaterina Politsyna, Sergey Politsyn, Porechniy Alexander</i>	
Parallel Implementation of 3D Model of Wave Hydrodynamics and Its Verification .....	149
<i>Sofya Protsenko</i>	
Undecidability of Unary Unnested PFP-Operators for One Successor .....	154
<i>Vseslav Sekorin</i>	

Formalization of the Concept of Relationship for Qualitative Data Analysis .....	160
<i>Mikhail Fadeev, Nikolai Balakirev</i>	
Fuzzy Interval-Valued Numbers in the Evaluation of Uncertain Parameters of the Investment Projects .....	166
<i>Tatyana Azarnova, Natalya Asnina, Yulia Bondarenko</i>	
Simulation of Avalanche-Threatening Snow Mass Movement .....	171
<i>Andrey V. Kalach, Alexander S. Soloviev, Tatiana V. Lentyaeva, Elena V. Kalach, Pavel M. Ageev</i>	
Computer-Assisted Approach to Study of Bacterial Communication for Landau-Based Model of Population Growth .....	174
<i>Shuai Yixuan, Anna Maslovskaya</i>	
Comparison of Heuristic Strategies for Sugar Beet Processing Schedules.....	181
<i>Dmitry V. Balandin, Albert I. Egamov, Oleg A. Kuzenkov</i>	
Graph-Structural Modeling: Clique Approach .....	187
<i>Semen Blyumin, Natalya Zhubanova, Anton Sysoev</i>	
On the Problem of Portfolio Optimization with Constraints on Possibility/Necessity-Probability and Probability-Possibility/Necessity.....	191
<i>Julia Egorova, Alexander Yazenin</i>	
Modeling of Extended Flooding of the Volga-Akhtuba Floodplain Under Various Conditions .....	197
<i>Anna Y. Klikunova, Tatyana A. Dyakonova, Ekaterina O. Agafonnikova</i>	
Computer Simulation of the Surface Radiometry Process .....	203
<i>Dmitri Knyazkov</i>	
Implementation and Research of Finite Element Method for Nonlocal Elasticity Theory Problems in Julia Programming Language.....	210
<i>G. N. Kuvyrkin, I. Y. Savelyeva, A. A. Sokolov, A. V. Cherednichenko, O. V. Novozhilova</i>	
Mathematical Modeling of Seismodynamics of an Extended Pipeline in Liquefiable Soil.....	215
<i>Ibrakhim Mirzaev, Jakhongir Shomurodov</i>	
Time-Fractional Approach for Numerical Simulation of Temperature-Dependent Hysteresis in Ferroelectrics .....	220
<i>Lubov Moroz, Anna Maslovskaya</i>	
Elementary Theoretical Model of Thermal Breakdown Generation in Semiconductor Film .....	226
<i>Yuri Virchenko, Natalia Andreyeva</i>	
On the Order of Removing of Uncertainty Principles in the Problems of Possibilistic-Probabilistic Programming and the Evolutionary Method of Their Solution .....	232
<i>Ilia Soldatenko, Alexander Yazenin</i>	
On the Implementation of the System-Biological Approach in Modeling the Functioning of Degenerative Diseases Biomarkers .....	237
<i>Olga Voropaeva, Sofia Senotrusova</i>	
Application of Computational Theory of Semantic Interpretation to Detect Cybercrime .....	244
<i>Yury Vishnyakov, Renat Vishnyakov</i>	

Method of Interval Assessment of Information Efficiency of Network Infocommunication Systems .....	248
<i>Alexander Mezhuyev, Alexander Korennoy, Denis Rodionov, Dmitry Sturov</i>	
The Influence of Shape Defects on the Spectrum of Natural Frequencies of a Cylindrical Resonator of a Solid-State Wave Gyroscope .....	255
<i>Igor L. Bataronov, Genadiy E. Shunin, Sergey A. Kostryukov, Vadim V. Peshkov</i>	
Fibonacci Model Unitary Subgroup Structure.....	259
<i>Pavel Gilev, Vladislav Katasonov, Igor Popov</i>	
System Analysis of Multi-Factor Authentication Methods to Improve the Security of Access to Data in an it Company's Information System .....	262
<i>Alexandr Dushkin, Sergey Kochedykov, Alexandr Gureev, Yuri Savchenko</i>	
Models and Algorithms to Support the Coordination of Socio-Economic Indicators of Regional Development in the Context of Epidemiological Restrictions .....	266
<i>Yulia Bondarenko, Tatyana Azarnova, Tatyana Nedikova</i>	
Searching Algorithm for Scientific Articles About COVID-19 .....	271
<i>Andrei Stroganov, Dmitrii Borisenkov</i>	

#### **Author Index**