

# 5th International Conference on Control Systems, Mathematical Modeling, Automation and Energy Efficiency



## SUMMA2023 CONFERENCE PROGRAM

November, 8-10, 2023 | Russia, Lipetsk



## SUMMA2023 CONFERENCE

The 5th International Conference on Control Systems, Mathematical Modeling, Automation and Energy Efficiency (SUMMA2023) focuses on the wide range of topics related to Control Systems and Mathematical Modeling, Automation and using advanced knowledge in the Power Industry to solve scientific and practical production problems. Traditionally the conference is jointly organized by V.A. Trapeznikon Institute of Control Sciences RAS and the Department of Automation and Computer Science of Lipetsk State Technical University.

Special session is dedicated to the memory of Prof. Semen Blyumin (1942-2023).

We hope, that the Conference will become a traditional place to discuss special issues of Control Systems and Mathematical Modeling, Automation and using advanced knowledge in the Power Industry to solve scientific and practical production problems.

## SUMMA2023 TOPICS

Scientific program includes topics of interest that consist of, but are not limited to:

I. Industrial Applied Mathematics and Modeling *Mathematical Foundations of Control Theory; Control of Organizational and Socio-Economic Systems; Machine Learning*

II. Automation *Industrial Automation and Control Theory applying to Technological Processes; Digitalization in Industrial, Economic and Social Systems; Metals and Mining Industry; Transportation Systems*

III. Industrial and Commercial Power and Power Conversion Systems *Energy Systems and Power Systems Engineering: Electric Machines and Industrial Drives; Power Electronic Devices and Components*

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Wednesday, November, 8 2023

[Join Opening Ceremony \(via Yandex Telemost\)](#)

10:00 – 10:30 (MSK, UTC+3)	Opening Ceremony
	Lilia ZAGEEVA, Cand.Sc., Associate Prof. <i>Russia, Lipetsk, Lipetsk State Technical University</i> Dmitry NOVIKOV, Academician of RAS, D.Sc., Prof. <i>Russia, Moscow, V.A. Trapeznikov Institute of Control Sciences RAS</i> Stanimir VALTCHEV, Prof. <i>Portugal, Universidade Nova de Lisboa</i> Ilhami COLAK, Prof. <i>Turkyie , Istanbul, Istanbul Nisantasi University</i>
10:30 – 12:30 (MSK, UTC+3)	Plenary Session <span style="float: right;">Chair Prof. Dmitry NOVIKOV</span>
	Dmitry NOVIKOV, Academician of RAS, D.Sc., Prof. <i>Russia, Moscow, V.A. Trapeznikov Institute of Control Sciences RAS</i> Modern Challenges of Control Theory
	Pavel SARAEV, D.Sc., Associate Prof. <i>Russia, Lipetsk State Technical University</i> Attacks in Machine Learning Systems
	Stanimir VALTCHEV, Prof. <i>Portugal, Universidade Nova de Lisboa</i> The Hydrogen as the Energy Source and the Energy Storage of the Future
	Anatoly POGODAEV, D.Sc., Prof. <i>Russia, Lipetsk State Technical University</i> In Memory of Professor Semen Blyumin
12:30 – 13:30 (MSK, UTC+3)	Dinner
13:30 – 15:00 (MSK, UTC+3)	Section Sessions
15:00 – 15:30 (MSK, UTC+3)	Coffee Break
15:30 – 18:00 (MSK, UTC+3)	Section Sessions
18:30 – 21:00 (MSK, UTC+3)	Welcome Dinner

Thursday, November, 9 2023

[Join Plenary Session \(via Yandex Telemost\)](#)

10:00 – 11:30 (MSK, UTC+3)	Plenary Session <span style="float: right;">Chair Prof. Ilhami COLAK</span>
	Ilhami COLAK, Prof. <i>Turkyie , Istanbul, Istanbul Nisantasi University</i> Electric Vehicles

	Alexander BOLSHAKOV, D.Sc., Prof. <i>Russia, Saint-Petersburg, Peter the Great St. Petersburg Polytechnic University</i> Using Intelligent Methods to Determine the Presence of Counterfeits in Meat Products
	Maxim SHERBAKOV, D.Sc., Associate Prof. <i>Russia, Volgograd, Volgograd State Technical University</i> Predictive Maintenance System Design: Approaches Based on Deep Learning
11:30 – 12:00 (MSK, UTC+3)	Coffee Break
12:00 – 14:30 (MSK, UTC+3)	Section Sessions
14:30 – 15:00 (MSK, UTC+3)	Coffee Break
15:00 – 18:15 (MSK, UTC+3)	Section Sessions

## Friday, November, 10 2023

### [Join Plenary Session \(via Yandex Telemost\)](#)

	Plenary Session <span style="float: right;">Chair Prof. Anton GLUSHCHENKO</span>
10:00 – 11:30 (MSK, UTC+3)	Anton GLUSHCHENKO, D.Sc., Associate Prof., Konstantin LASTOCHKIN <i>Russia, Moscow, V.A. Trapeznikov Institute of Control Sciences RAS</i> Modern Methods and Algorithms of Parametric Identification for Dynamical Systems
	Alexey EGOROV, D.Sc., Associate Prof. <i>Russia, Lipetsk, Lipetsk State Technical University</i> Modeling Machining Processes and Technical Measurements in Mechanical Engineering within the Framework of Industry 4.0
	Sophiya RUMOVSKAYA, Cand.Sc., Associate Prof. <i>Russia, Kaliningrad, Kaliningrad Branch of the FRC CSC RAS</i> Building of Real-life and Artificial Intelligent Self-organizing Systems
11:30 – 12:00 (MSK, UTC+3)	Coffee Break
12:00 – 13:15 (MSK, UTC+3)	Section Sessions
13:15 – 13:30 (MSK, UTC+3)	Closing Ceremony
13:30 – 16:30 (MSK, UTC+3)	Visit to Novolipetsk Steel Corporation

**DETAILED PROGRAM**  
**Wednesday, November, 8 2023**  
**(Moscow time, UTC+3)**

[Join Session AM.1.1 \(via Yandex Telemost\)](#)

Session AM.1.1 Industrial Applied Mathematics and Modeling – Mathematical Foundations of Control Theory (13:30-15:00)		Chairs  Dr. Roman Batischev	ArtID
13:30-13:45	<i>Oleg Malafeyev, Kun Zhang, Irina Zaitseva, Tatiana Smirnova, Sergei Strekopytov and Sergei Miheev</i> Problems of Search and Pursuit of Unmanned Aerial Vehicles Using the Game-Theoretic Approach		6
13:45-14:00	<i>Nikolay Karabutov</i> On Structural Identifiability of System with Nonsymmetric Nonlinearities		11
14:00-14:15	<i>Fatimat Kudayeva</i> A Free-boundary Problem in Medicine		13
14:15-14:30	<i>A. A. Jung and A. G. Shevtsova</i> Mathematical Description of the Influence of Sim on The Movement of Tp in the Area of a Controlled Intersection		41
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14:45-15:00	<i>Vladislav Gusev</i> Calculation of the Economy Technological Complex Structural Management		44

[Join Session AM.2.1 \(via Yandex Telemost\)](#)

Session AM.2.1 Industrial Applied Mathematics and Modeling – Control of Organizational and Socio-Economic Systems (13:30-15:00)		Chairs  Prof. Dmitry Kononov	ArtID
13:30-13:45	<i>Dmitry Kononov and Meran Furugyan</i> Distribution of Heterogeneous Complex of Resources on a Multiprocessor System		17
13:45-14:00	<i>Valery Akinfiev</i> Choice of Investment Decisions by Generating Companies, Taking into Account Payments for CO2 Emissions		37
14:00-14:15	<i>Dmitry Kononov and Meran Furugyan</i> Some Algorithms for Planning Uninterrupted Jobs in Real-Time Computing Systems		39
14:15-14:30	<i>Viktoriya Latypova</i> Decision-Making Support in Optimal Multicriteria Peer Reviewer Selection in Scientific Conference Organization		40
14:30-14:45	<i>Ekaterina Orlova</i> Reinforcement Learning Algorithms Performance Evaluation for Management Problems Decision in Socio-Economic Systems		52

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13:45–14:00	<i>Rade Kačar, Darko Čulibrk, Olja Čokorilo and Petar Miroslavljević</i> Aircraft Accident Prediction Using Machine Learning Classification Algorithms	5
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14:15–14:30	<i>Bogdan Salyp and Julia Vishnevskaya</i> Comparison of Applicability of Synergetic Models with Convolutional Neural Networks as an Example of Pattern Recognition	12
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### [Join Session A.1.1 \(via Yandex Telemost\)](#)

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13:45–14:00	<i>Viktor Meshcheryakov, Liubov Yazykova, Inna Muzyleva and Stanimir Valtchev</i> Method for Improving Dynamic Characteristics of Electromechanical Transducer Based on Induction Motor	30
14:00–14:15	<i>A.P. Mazurenko, V.V. Mishin and V.N. Orobinskaya</i> On the Issue of Developing an Agent- Based Model of the Hydrolithosphere of a Resort and Recreational Region	45
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## [Join Session A.2.1 \(via Yandex Telemost\)](#)

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14:30-14:45	<i>Y.Y. Gromov, P.I. Karasev, M.A. Gladyshev, Mustafa Abdulkadhim Dhahir Al-Ameedee, Shamsuldaeen Haidar Abdulwahhab H and Almali Ahmed Adnan Lateef</i> Smart Card with Biometric Authentication Using a Fingerprint Scanner	74
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Session AM.1.2 Industrial Applied Mathematics and Modeling – Mathematical Foundations of Control Theory (15:30–18:00)		Chairs  Prof. Anton Glushchenko	ArtID
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## [Join Session E.1.1 \(via Yandex Telemost\)](#)

Session E.1.1 Industrial and Commercial Power and Power Conversion Systems – Energy Systems and Power Systems Engineering (15:30-18:15)		Chairs  Prof. Stanimir Valtchev	ArtID
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16:00-16:15	<i>Igor Fomin, Vadim Chernyshov, Maxim Borodin, Roman Belikov and Vadim Bolshev</i> Failure Control Scheme of Network Automatic Transfer Switching Unit in Ring Network		21
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Session E.1.1 Industrial and Commercial Power and Power Conversion Systems – Energy Systems and Power Systems Engineering (15:30-18:15)		Chairs  Prof. Stanimir Valtchev	ArtID
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17:00-17:15	<i>Alan Alimuradov, Alexander Tychkov, Dmitry Dudnikov and Pyotr Churakov</i> Software and Hardware Implementation of a System to Detect and Classify Human Emotional States from Speech Signals Under Extreme Conditions		85

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**Thursday, November, 9 2023**  
**(Moscow time, UTC+3)**

**[Join Session AM.1.3 \(via Yandex Telemost\)](#)**

Session AM.1.3 Industrial Applied Mathematics and Modeling – Mathematical Foundations of Control Theory (12:00–14:30)		Chairs  Prof. Anatoly Pogodaev	ArtID
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12:15–12:30	<i>Vladimir Dmitriev, Leonid Aronov and Alexander Smirnov</i> Modification of the ADPCM Codec Based on a Modification of the Khurgin-Yakovlev Algorithm		139
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13:00–13:15	<i>Andrey Kozyr and Sergey Feofilov</i> Synthesis of Neural Network Stabilizing Control for Objects with Mechanical Limiter		166
13:15–13:30	<i>Semen Blyumin, Anatoly Pogodaev and Andrey Grigoriev</i> Implementation of the Uncertainty Estimation of the Measurement of a Complex Quantity by Various Methods		245
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**(Moscow time, UTC+3)**

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12:30–12:45	<i>Sergey Khalapyan and Anpilov Aleksandr</i> The Concept of Individual Regulation of Vacuum Filters Technological Parameters in Iron Ore Concentrate Dehydration Process		234
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