



Critical Infrastructures in the Digital World

**IWCI 2023 PROCEEDINGS & PROGRAMME OF
THE INTERNATIONAL WORKSHOP**

**March 16 – 21, 2023
Bolshoe Goloustnoe**

**CRITICAL INFRASTRUCTURES
IN DIGITAL WORLD - 2023
WORKSHOP
PROGRAMME**

March 16, 10:00

Thursday

**Departure from Irkutsk at 10:00
Arrival in the Bolshoe Goloustnoe**

March 16, 14:00

Thursday

Baikal Greeting

March 16, 20:00

OPENING CEREMONY

Welcome Party

March 21, 10:00

Tuesday

Departure of the participants to Irkutsk

SESSION 1

1. The main directions of scientific activity of the Institute of Computational Mathematics and Mathematical Geophysics of the SB RAS / **Marchenko Mikhail** (*ICMMG SB RAS, Novosibirsk*)
2. The main directions and results of digitalization of the Irkutsk National Research University / **Kopaygorodsky Aleksei** (*Irkutsk National Research Technical University, Irkutsk*)
Ontologies application for semantic search and classification of texts / **Kopaygorodsky Aleksei** (*Melentiev Energy Systems Institute SB RAS, Irkutsk National Research Technical University, Irkutsk*)
3. The main directions of scientific activity of the Melentiev Energy Systems Institute of SB RAS / **Massel Liudmila** (*Melentiev Energy System Institute SB RAS, Irkutsk*)
The purpose and IT-infrastructure architecture for building prototypes of intelligent control systems for the development and operation energy systems / **Massel Liudmila** (*Melentiev Energy System Institute SB RAS, Irkutsk*)
4. Cognitive and linear optimization models to study energy security threats / **Pyatkova Natalia, Massel Alexey** (*Melentiev Energy Systems Institute SB RAS, Irkutsk*)
5. Semantic analysis of interrelationships within a system of models for evaluating the price elasticity of demand for electricity / **Vorozhtsova Tatiana, Galperova Elena** (*Melentiev Energy Systems Institute SB RAS, Irkutsk*)
6. Development of information and computing system ICS WICS for assessing environmental pollution by energy facilities / **Kuzmin Vladimir** (*Melentiev Energy Systems Institute SB RAS, Irkutsk*)
7. Reengineering the software complex "Analysis of the seismic process" / **Malinovtsev Ivan**¹, Massel Aleksei² (on-line)
¹*Irkutsk National Research Technical University, Irkutsk*
²*Melentiev Energy Systems Institute SB RAS, Irkutsk*

1. The terminology structure of the information system of state budget management / **Erzhenin Roman** (*LLC KRISTA-IRKUTSK, Irkutsk*)
2. The multidimensional time concept and areas of its application for the integration of critical systems / **Zinder Evgeny** (*National Association of Enterprise Architects, Russian Municipal Academy, Moscow*) (on-line)

March 18, 10:00

Saturday

SESSION 2

1. Experience in predicting occupational morbidity at the objects of critical infrastructure of the Irkutsk region / **Dyakovich Marina** (*Angarsk State Technical University, Angarsk, Russia*)
2. The technologies applied when developing the software "Forecasting of professional disease with the method of normalized intensive indicators (NII)" / **Manuylov Sergei** (*East-Siberian Institute of Medical and Ecological Research, Angarsk*)
3. The system of information support for plant production management processes / **Baimakov Aleksander, Zamaraev Aleksei, Ivanyo Yaroslav** (*Irkutsk State Agrarian University named after A.A. Ezhevsky*)
4. About three variants of linear programming problems applied to agricultural production / **Kovadlo Iliya, Ivanyo Yaroslav, Fedurina Nina** (*Irkutsk State Agrarian University named after A.A. Ezhevsky*)
5. Modeling of climatic and biological risks in agricultural production / **Kolokoltseva Irina, Ivanyo Yaroslav, Petrova Sofia** (*Irkutsk State Agrarian University named after A.A. Ezhevsky*)
6. Multi-stage models of mathematical programming and their applications in agriculture / **Sinitsyn Maksim, Ivanyo Yaroslav, Polkovskaya Marina** (*Irkutsk State Agrarian University named after A.A. Ezhevsky*)
7. Modeling of time series of characteristics associated with food production / **Tsyrenzhapova Valentina, Ivanyo Yaroslav, Barsukova Margarita** (*Irkutsk State Agrarian University named after A.A. Ezhevsky*)
8. "Smart lecture room": design, realization, use / **Asalkhanov Peter, Petrova Sofia, Ivanyo Yaroslav** (*Irkutsk State Agrarian University named after A.A. Ezhevsky*)

SESSION 3

1. The leading role of the Ygra Research Institute of Information Technologies in the digitalization of the Khanty-Mansiysk Region / **Melnikov Andrey** (*Yugorsky Research Institute of Information Technologies, Khanty-Mansiysk*)
2. Evaluation of the effectiveness of measures to create a comfortable urban environment based on neural network models / **Galagan Konstantin** (*Yugra State University, Khanty-Mansiysk*) (on-line)
3. Model of segmentation of forest logging in satellite images / **Abbazov Valeryan¹, Baluyev Vladimir¹, Melnikov Andrey^{1,2}, Rusanov Mikhail^{1,2}**
¹*Yugra Research Institute of Information Technologies, Khanty-Mansiysk*
²*Yugra State University, Khanty-Mansiysk* (on-line)
4. On the construction of the model of train movement along a railway section based on the queuing theory / Zharkov Maxim, **Lempert Anna** (*Matrosov Institute for System Dynamics and Control Theory SB RAS, Irkutsk*) (on-line)
5. On the application of multiphase queuing systems for solving engineering problems / Zharkov Maxim¹, **Vu Hoang²**
¹*Matrosov Institute for System Dynamics and Control Theory SB RAS, Irkutsk*
²*Irkutsk National Research Technical University, Irkutsk*
6. Routing problems for the area having dynamically changing properties / Lempert Anna¹, **Tran Viet²**
¹*Matrosov Institute for System Dynamics and Control Theory SB RAS, Irkutsk*
²*Irkutsk National Research Technical University, Irkutsk*
7. On the problem of covering three-dimensional bodies by spherical segments / Kazakov Alexander¹, **Nguyen Minh²**
¹*Matrosov Institute for System Dynamics and Control Theory SB RAS, Irkutsk*
²*Irkutsk National Research Technical University, Irkutsk*

SESSION 4

1. Integrating the research into resilience of energy and socio-ecological systems using artificial intelligence methods / Massel Liudmila, **Pesterev Dmitrii** (*Melentiev Energy Systems Institute SB RAS, Irkutsk*)
2. Application of software “INTEC-A” for resilience assessment of energy systems / Massel Lyudmila, Massel Aleksei, **Mamedov Timur**, Gaskova Daria (*Melentiev Energy Systems Institute SB RAS, Irkutsk*)
3. Specification of concepts and relationships for the integration of the software INTEC-A and cognitive modeling / **Gaskova Daria**, Mamedov Timur, Massel Aleksei (*Melentiev Energy Systems Institute SB RAS, Irkutsk*)
4. Exploratory data analysis and machine learning methods for researching time series / **Tsybikov Aleksey**, Massel Aleksei (*Melentiev Energy Systems Institute SB RAS, Irkutsk*)
5. Development of a wind farm digital twin using the UNITY environment / Massel Aleksei, **Shchukin Nikita** (*Melentiev Energy Systems Institute SB RAS, Irkutsk*)
6. Digital twin as a means of increasing cyber-physical resilience of smart energy system facilities / **Demidov Ivan**, Kolosok Irina, Korkina Elena (*Melentiev Energy Systems Institute SB RAS, Irkutsk*)
7. The accuracy estimation of forest fire risk prediction based on CBR (Case-Based Reasoning) approach / **Pestova Yulia** (*Matrosov Institute for System Dynamics and Control Theory RAS, Irkutsk*)
8. Development of practical approaches to the determination of reference intervals by indirect methods / **Kuz'menko Vladimir**¹, **Gornov Alexander**²
¹*ISMAPgE – Branch Campus of the FSBEI FPE RMACPE MOH Russia, Irkutsk*
²*Matrosov Institute for System Dynamics and Control Theory SB RAS, Irkutsk*

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1. Methodological approaches to assessing the level of digital transformation of the electric power industry in Belarus / **Zorina Tatiana** (*Energy Institute of the National Academy of Sciences of Belarus, Minsk, Belarus*) (on-line)
 2. Application of virtualization in construction of digital twins / **Massel Aleksei** (*Melentiev Energy Systems Institute SB RAS, Irkutsk*)

March 20, 10:00

Monday

SESSION 5

1. Risk assessment of the demand-response aggregator / Kolosok Irina, **Korkina Elena** (*Melentiev Energy Systems Institute SB RAS, Irkutsk*) (on-line)
2. System for processing and visualizing the results of the data of solar panel stand monitoring / Ivanov Roman, **Maxakov Nikita** (*Melentiev Energy Systems Institute SB RAS, Irkutsk*)
3. Computational technologies of optimization and applications / **Gornov Aleksander**, Anikin Anton, Zarodnyuk Tatiana, Sorokovikov Pavel, Tyatyushkin Aleksander (*Matrosov Institute for System Dynamics and Control Theory SB RAS, Irkutsk*)
4. Development of information and search system for the preparing the issues and working with the archive of the reviewed scientific journal / **Popova Maria** (*Melentiev Energy Systems Institute SB RAS, Irkutsk*)
5. On training the of IT specialists at the Institute of Information Technologies and Data Analysis of IRNITU / **Bakhvalov Sergey, Bakhvalova Zinaida** (*Irkutsk National Research Technical University, Irkutsk*)
6. On the transformation of Ufa State Aviation Technical University into the Ufa University of Science and Technologies / **Tuktarova Polina** (*Ufa State Aviation Technical University*)

March 20, 12:30

Round Table

Monday

Categorical structures of system metaobjects / **Scripkin Sergey** (*Melentiev Energy Systems Institute SB RAS, Irkutsk*) (on-line)

March 20, 14:00

Monday

HOVERCRAFT (KHIVUS) TOUR TO PESCHANAYA BAY

March 20, 20:00

Monday

**FINAL DISCUSSION
CLOSING CEREMONY**