International Scientific and Technical Conference

INTEGRATED COMPUTER TECHNOLOGIES IN MECHANICAL ENGINEERING – SYNERGETIC ENGINEERING

December 28, 2023 – Kharkiv, Ukraine.

Organized by:

NATIONAL AEROSPACE UNIVERSITY "KHARKIV AVIATION INSTITUTE"

Patronized by:

MINISTRY OF EDUCATION AND SCIENCE OF UKRAINE

KHARKIV REGIONAL STATE ADMINISTRATION

December 28, 2023 – Kharkiv, Ukraine

GENERAL SCHEDULE (UTC+2)

December 28, 2023 (Thursday)

8:20	TESTING SESSION: https://meet.google.com/tur-jkmi-hia
8:25	REGISTRATION OPENS
8:30	CONFERENCE OPENING
8:40	PLENARY SESSION
9:00	Session 1 – MECHANICAL ENGINEERING https://meet.google.com/tur-jkmi-hia / Session 2 – SMART SYSTEMS AND IT-INFRASTRUCTURE https://meet.google.com/qfg-ujgm-yov / Session 3 – CONTROL SYSTEMS AND BUSINESS INFORMATICS https://meet.google.com/zxs-hmqg-sgz
11:50	TECHNICAL BREAK
12:00	Session 1 – MECHANICAL ENGINEERING https://meet.google.com/tur-jkmi-hia / Session 2 – SMART SYSTEMS AND IT-INFRASTRUCTURE https://meet.google.com/qfg-ujgm-yov / Session 3 – CONTROL SYSTEMS AND BUSINESS INFORMATICS https://meet.google.com/zxs-hmqg-sgz
14:20	
14:40	CLOSING PANEL DEBATES / CLOSING PANEL DEBATES
14:55	CLOSING OF THE CONFERENCE: LOOKING TO THE FUTURE

December 28, 2023 – Kharkiv, Ukraine

ICTM-2023 COMMITTEES

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Executive Chair
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Program Committee Chair
Volodymyr PAVLIKOV, Doctor of Technical Sciences, Professor (National Aerospace University "Kharkiv Aviation Institute", Kharkiv, Ukraine).

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Illia POLOSUKHIN (NEAR.ai, San Francisco, CA, USA);

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ORGANIZING TEAM (National Aerospace University "Kharkiv Aviation Institute", Kharkiv, Ukraine)

Publication Chair: Dmitriy KRITSKIY.

Members (in alphabetical order): Andrii BYKOV, Vasylysa KALASHNIKOVA, Oleksandr KARATANOV, Olha KRYTSKA, Olga SHYPUL.

THE OFFICIAL LANGUAGE OF THE ICTM-2023 IS ENGLISH

Time for presentations:

Presentation at the plenary session – max 20 minutes.
Paper presentation and discussion at the regular session – max 10 minutes.

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December 28, 2023, Thursday

8:20	TESTING SESSION: https://meet.google.com/tur-jkmi-hia
8:25	REGISTRATION OPENS
8:30	CONFERENCE OPENING **Dr. Oleksii LYTVYNOV** – Honorary Chair of ICTM-2023 National Aerospace University "KhAI", Ukraine
8:40 8:50	PLENARY SESSION Keynote Speaker 1 – Scott Whitmore *Grant Programs for the Development of Science and Higher Education in Ukraine* Acting Cultural Affairs Officer, U.S. Embassy in Ukraine Keynote Speaker 2 – Dr. Sergey SHKARAYEV Director of Micro Air Vehicles Laboratory at the University of Arizona, USA
	SESSION 1 – MECHANICAL ENGINEERING https://meet.google.com/tur-jkmi-hia Dr. Olga Shypul – Chairman National Aerospace University "KhAI", Ukraine
Topic 1 – Aerospace Engineering	
9:00	*Ivan Ostroumov* Statistical analysis of airplane pressure altitude datasets
9:10	*Konstantin Avramov, S. Malyshev, Vitalii Miroshnikov and Iryna Hariachevska* Forced nonlinear bending vibrations of beams with two breathing cracks
9:20	*Valeriy Sikulskyi, Kateryna Maiorova, Olga Shypul, Viacheslav Nikichanov, Oleksandra Kapinus, Oleg Tryfonov and Iryna Voronko* Algorithm for Selecting the Optimal Technology for Rapid Manufacturing and/or Repair of Parts
9:30	*Galyna Mygal, Olga Protasenko and Natalia Kobrina* The Eco-ergonomics Issues of the Digital Workplace
9:40	*Tan Kun, Hu Wenjie and Wang Yurong*

	Analysis of Particle Parameters of multi-channel mixed cross-section right-angle Cold Spray Nozzle Structure
9:50	*Maksym Yena* Analysis of the Urban Air Mobility for the unmanned aerial vehicle
10:00	*Oleksii Tretiak, Anton Kovryga, Pavlo Makarov, Nataliia Penkovska and Stanislav Kravchenko* Mathematical Modeling of the Thermal State of the Brush-Holders Device in a Three-Dimensional Setting
10:10	*Sergiy Melnikov, Igor Taranenko, Tetyana Nabokina and Andrii Kondratiev* Process-Induced Stresses and Deformations of Hobe Block During Shrinkage and Cooling
10:20	*Kostiantyn Danko, Oleksandr Shorinov, Yurii Neveshkin and Sergii Polyvianyi* Temperature and Velocity Changes of ZrO2 Particles in the Process of HVOF Spraying by Twin-Combustion-Chamber Burner
10:30	*Olha Sushchenko and Yurii Bezkorovainyi* Robust Parametrical Optimization of Discrete System for Stabilization of Apparatus of Land Moving Vehicles
10:40	*Valeriy Sikulskyi, Kateryna Maiorova, Vadim Garin, Vitalii Myntiuk and Stanislav Sikulskyi* Modeling hole edge and burr formation during drilling using LS-DYNA
10:50	*Sergei Filipkovskij and Andrii Avershyn* Aerodynamic Interaction of Minivan Vehicles During an Overtaking Maneuver
11:00	*Valeriy Sikulskyi, Kateryna Maiorova, Serhii Krasovskyi, Andrii Rebrin and Viktor Agarkov* Experimental research of electrofinishing processing of high precision parts as a composition of convergence technology
11:10	*Nataliia Fomenko and Oleksiy Larin* ML-approach for modeling viscoelastic and physically nonlinear materials based on symbolic regression
Topic 2 – Transport Systems and Logistics	
11:20	*Nataliia Kobrina, Kostiantyn Dolia and Olena Dolia* Engineering patterns of changes in the parameters of functioning of intercity passenger transportation system
11:30	*Maksym Yena* Optimizing Air Traffic Control: Innovative Approaches to Collision Avoidance in UAV Operations

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11:40	*Oleh Strelko, Tetiana Hrushevska, Vasyl Gaba, Hanna Kyrychenko and Yuliia Berdnychenko* Study of the dimensions of suburban trains movement on the site by the integer programming method
11:50	TECHNICAL BREAK

Topic 3 – Information Technology in Design and Manufacturing of Engines

12:00	*Eduard Khomiak, Viktoriia Burdeina, Olena Cherniak, Olesia Nechuiviter and Tetiana Bubela* Improving the method of quality control of the fuel element shell in order to improve the safety of a nuclear reactor
12:10	*Konstantin Avramov and Marina Chernobryvko* Transient Motions of Solid Propellant Motor Casing at Launch Vehicle Liftoff
12:20	*Volodymyr Martynenko* Numerical and Experimental Investigation of the Rotor Blade Joint
12:30	*Natalia Smetankina and Serhii Morhun* Numerical Analysis of the Modern Marine Gas Turbine Rotor Stress-Strain State
12:40	*Yevhen Nemanezhyn, Gennadiy Lvov and Yuriy Torba* A Research on the Influence of Anisotropic Characteristics of Single-Crystal Gas Turbine Blades on Their Durability
12:50	*Oleksandr Shmarkov, Serhiy Serbin and Mykola Bondarenko* Utilizing CFD Technology in the Design of the Combustion Chamber for the Hydrogen-Powered Hybrid Energy System
13:00	*Kyryl Degtyariov, Denis Kriutchenko, Ivan Osypov, Olena Sierikova and Elena Strelnikova* Dampers Influence on Sloshing Mitigation in Fuel Tanks of Launch Vehicles and Reservoirs
13:10	*Gennadii Kaniuk, Andrii Mezeria, Tetiana Fursova, Maksym Kaniuk and Igor Babenko* Development and Implementation of Energy-Saving Control Algorithms for Pumping Units of Power Plants to Increase their Operational Quality
13:20	*Halina Kobalava, Dmytro Konovalov, Oleksandr Voinov and Viktor Samokhvalov* Analyzing Thermophysical Phenomena in a Thermopressor for Air Intercooling Systems
13:30	*Mykhailo Kuchma and Gennadii Martynenko* Methods of Parametric Modeling and Simulation Numerical Analysis of Rotor Dynamics in Active Magnetic Bearings on Example of the Turbocompressor

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13:40	**Gennadii Martynenko and Lyudmyla Rozova** Adaptation of the Rotor Design of Expander-Compressor Unit for the Installation of Magnetic Bearings Based on Dynamic Analysis Using Integrated Computer Systems
13:50	**Victoria Kornienko, Roman Radchenko, Volodymyr Korobko, Oleksii Ostapenko and Serhii Shevchenko** Analyzing exergy losses when utilizing the heat of exhaust gases in boiler

Topic 4 – Information Technology in the Creation of Rocket Space Systems

14:00	**Fedir Gagauz and Serhii Kryvenda** Preliminary design approach for lattice composite keel beam
14:10	**Andrii Pohudin, Sergii Gubin, Yurii Shepetov, Larysa Babakova and Oleksii Dzvonyskyi** Energy Characteristics of Solar Arrays of the University Microsatellite for Remote Sensing of the Earth
14:20	**Pavlo Gakal, Iryna Tretiak, Maria Arefieva and Viacheslav Nazarenko** Thermal State Determination of the Heat Exchanger in the Three-Dimensional Setting
14:30	**Natalia Smetankina, Vadym Khvorostyanyi, Denys Ustuhov, Volodymyr Bodunov and Iryna Kachinska** Damageability Assessment of Impact-Resistant Glass for Transparent Armor Systems
14:40	CLOSING PANEL DEBATES
14:45	CLOSING OF THE CONFERENCE: LOOKING TO THE FUTURE https://meet.google.com/tur-jkmi-hia

SESSION 2 – SMART SYSTEMS AND IT-INFRASTRUCTURE https://meet.google.com/qfg-ujgm-yov Dr. Dmytro Chumachenko – Chairman National Aerospace University "KhAI", Ukraine

Topic 1 – Signal and Image Processing

9:00	**Manh Hung Tran** Methodology of detection and recognition of faults in the unit components
9:10	**Valeriyi Kuzmin, Olga Ivanets, Maksym Zaliskyi, Olga Shcherbyna, Oleksii Holubnychyi and Oksana Sevriukova** Methods for Time Series Analysis Using Segmented Regression with Heteroskedasticity

9:20	*Oleksandr Vasilevskyi, Roman Trishch, Emanuel Popovici, Volodymyr Sarana and Romualdas Ginevičius* Experimental studies of blood pressure using ECG and PPG signals obtained from the fingers on the hand
9:30	*Oleksandr Zabolotnyi, Vitalii Zabolotnyi and Nikolay Koshevoy* Two Factor Dispersion Analysis of the Capacitive Grain Moisture Meters' Transfer Function
9:40	*Olha Inkarbaieva, Semen Zhyla, Anatoliy Popov and Mariya Bortsova* Simulation of Onboard Helicopter Radar Signals for Surface Elevation Measurements
9:50	*Oleksandr Zabolotnyi and Dmitriy Tsiban* Current Trends in Bulk Solids Quantity Monitoring Inside the Large Capacity Industrial Tanks and Reservoirs
10:00	*Victor Makarichev, Vladimir Lukin and Iryna V. Brysina* Complexity Reduction in DAT-based Image Processing
10:10	*Maryna Arkhyrei, Olga Ivanets, Mikle Burichenko and Oleg Melnykov* Features of biomedical signal processing using data mining elements
10:20	*Denys Kolesnikov, Volodymyr Pavlikov, Semen Zhyla, Dmytro Vlasenko, Danyil Kovalchuk and Kseniia Shcherbina* Statistical Optimisation of the Static Aperture Synthesis Method
10:30	*Oleh Viunytskyi and Alexander Totsky* ECG signal denoising by cross-bispectrum data processing
10:40	*Oleksandr Solomentsev, Maksym Zaliskyi, Bohdan Chumachenko and Vasyl Yehunko* Methodological Approach to the Design of Radio Equipment Operation System
10:50	*Tetiana Klochko, Vasilisa Kalashnikova, Konstantin Nosov, Ihor Bereshko and Yuri Bespalov* Relationships of colorimetric parameters of digital images of animals' color under different ecological situations
11:00	*Oleksandr Miroshnichenko, Mykola Ponomarenko, Sergey Abramov and Vladimir Lukin* Frequency Sub-band Reduction of Spatially Correlated Noise in Images
Topic 2 – Information Modeling	
11:10	*Dmytro Chumachenko and Plinio Morita* Understanding the Relationship between the Russian War in Ukraine and COVID-19 Spread in Canada using Machine Learning Techniques
11:20	*Andriy Kuritsyn, Igor Taranenko, Vitaly Miroshnikov, Vladislav Demenko and Andrii Kondratiev*

	Regression Analysis of Geometric Parameters of "Screw Implant – Maxillary Segment" Biomechanical System
11:30	***Olexander Betin, Petro Kyriienko, Denys Betin and Olena Betina*** Parameters and Characteristics of Parachute Systems for Physical Modelling Precision Airborne Cargo Landing
11:40	***Igor Linetskiy, Vladislav Demenko, Oleg Yefremov, Larysa Linetska and Andrii Kondratiev*** Crestal Versus Subcrestal Short Plateau Implant Placement
11:50	TECHNICAL BREAK
12:00	***Roman Voliansky, Oleksandr Sadovoi, Iurii Shramko, Nina Volianska and Olga Tolochko*** Smoothed Piecewise Linear Lyapunov Function for the First Order Dynamical Systems
12:10	***Serhii Kurennov, Kostiantyn Barakhov, Igor Taranenko, Olexandr Poliakov, Hanna Barakhova and Kristina Vernadska*** Hybrid Algorithm of Adhesive Joint Shape Optimization
12:20	***Valeriia Yevtushenko, Maryna Railian and Tetyana Chumachenko*** Intelligent Recommendation System for Assessing Hand Hygiene of Healthcare Workers
Topic 3 – Software Engineering and IT-Infrastructure	
12:30	***Kseniia Horina and Oleksandr Karatanov*** Advantages of Automated Testing of Medical Applications and Information Systems using Gherkin and Behavior-Driven Development
12:40	***Heorhii Zemlianko and Vyacheslav Kharchenko*** Ensuring cybersecurity of the cyber physical system of combined fleets of unmanned aerial, ground and sea vehicles
12:50	***Oleksandr Liubimov and Ihor Turkin*** Optimizing the CubeSat On-Board Computer Power Consumption under Hard Real-Time Constraints
13:00	***Oleg Fedorovich, Liudmyla Lutai, Vitalii Kompanets and Ihor Bahaiev*** The Creation of an Optimisation Component-Oriented Model for the Formation of the Architecture of Science-Based Products
13:10	***Olena Tachinina, Olexandr Lysenko, Sergiy Ponomarenko, Serhii Chumachenko and Vladyslav Kutiepov*** Engineering Methodology for the Synthesis of Control Algorithms for Digital Electric Drives of Mechatronic Devices of Flying Search Robots
13:20	***Maksim Iavich and Roman Odarchenko*** Automated penetration testing in 5G networks
13:30	***Bohdan Bohush, Tetiana Bubela and Roman Trishch*** Smart System for Meat Quality Control

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13:40	***Ihor Turkin and Oleksandr Nosykov*** The Software Engineers Student-Centered Learning
13:50	***Oleksandr Vdovichenko and Artem Perepelitsyn*** Analysis of Technologies for Reconfiguration of IoT Systems at Level of Software Modules and Bootloaders
14:00	***Maksim Ivanytskyi, Yuliya Averyanova and Yevheniia Znakovska*** Security Analysis of Meteorological Support Software for UAS Flight Planning
14:10	***Vasylysa Kalashnikova, Igor Binko and Vladimir Shevel*** Approaches to Structuring Control in an Automated Mobile System
14:20	CLOSING PANEL DEBATES
14:45	CLOSING OF THE CONFERENCE: LOOKING TO THE FUTURE https://meet.google.com/tur-jkmi-hia

	SESSION 3 – CONTROL SYSTEMS AND BUSINESS INFORMATICS https://meet.google.com/zxs-hmqg-sgz Dr. Oleksandr Karatanov – Chairman National Aerospace University "KhAI", Ukraine
Topic 1 – Control Systems and Engineering	
9:00	***Mykola Riabchykov, Viktoriia Mytsa, Dmytro Melnyk and Olena Pakholiuk*** Efficiency of Protective Textile Smart Systems Using Electronic Tags
9:10	***Andrew Larin, Aleksander Trubayev, Oleksandr Tymchenko, Oleksii Vodka and Kseniia Potopalska*** Modeling of Complex Spatial Structures Through the Example of the "Slavyanka UAS 7" Reaper
9:20	***Aleksander Trubayev, Bohdan Kashchei, Mykola Manilich and Heorhii Semenenko*** Development of an automated system for analyzing the stress-strain state of the elevator structure, taking into account operational conditions
Topic 2 – Smart Energy and Grids	
9:30	***Natalia Savchenko, Andrii Tretiak, Oksana Dovgalyuk, Dmytro Danylchenko and Tatyana Syromyatnikova*** Mobile solar power plant "Pyramid" with a kinetic energy storage
9:40	***Gennadii Kaniuk, Andrii Mezeria, Tetiana Fursova, Maksym Kaniuk and Hanna Blyznychenko***

	Improving the Quality and Energy Efficiency of Power Units of Thermal Power Plants by Optimizing the Operational Modes of Boiler Equipment
9:50	**Ajd Nanthakumar, Manikandan S and Amit Kumar** Hybrid Electric Vehicle Efficiency: Power Split Optimization and Control on Toyota Prius Hybrid

Topic 3 – Project Management and Business Informatics

10:00	**Olena Cherniak, Roman Trishch, Romualdas Ginevičius, Olesia Nechuiviter and Victoriia Burdeina** Methodology for assessing the processes of the occupational safety management system using functional dependencies
10:10	**Larysa Filipkovska and Maria Filipkovska** Cognitive Component of Development of the Innovative Diffusion of the Socio-Economic Systems
10:20	**Anastasiia Matvieieva, Maryna Cherkas, Hryhorii Hrytsenko, Maryna Semenova and Olena Rohova** The effectiveness of the work of international organi-zations: the current state and prospects for evaluating their work
10:30	**Olena Agapova** Building Resilience of the Ukrainian Educational System through International Legal Protection Mechanisms
10:40	**Giga Abuseridze, Olena Agapova and Vladas Tumalavicius** The Kremlin's Secret Weapon: How Russian Private Military Companies Are Expanding Moscow's Influence Abroad
10:50	**Giga Abuseridze** Correlation of Norms of International Law within the Framework of the WTO law: Conflicts between Treaties
11:00	**Kostiantyn Dyadyura, Andriy Slyuz, I.Yu. Vysotsky, Tetiana Bubela and Olena Cherniak** Increasing the work effective the supply system mining and mining enterprises in Ukraine by the implementation of complex photovoltaic power plant with solid-state gravity energy storage
11:10	**Karina Palkova, Vitālijs Rakstins, Andris Sprūds and Olena Agapova** Minimising the Risks of Foreign Influence in Research and Academic Context
11:20	**Ekaterina Bataeva, Iryna Sierykova and Yelyzaveta Streltsyna** Social Network Communication and Reading Practices of Ukrainian High School Students
11:30	**Olena Savchuk, Olena Zinchenko, Hanna Ponomarova, Viktoriia Panchenko and Zhanna Chevychalova** The System of Protection of Social Rights in Ukraine and the EU: European and National Dimension

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11:40	*Serhii Kravtsov, Victor Butenko, Stanislav Sieriebriak, Sergii Solodchenko and Maksym Bespalov* Conducting Business Activities in Special Conditions: Problems of Legal Regulation
11:50	TECHNICAL BREAK
12:00	*Tetiana Kurman, Yuliia Bakai, Olena Batyhina and Oksana Tuieva* Online dispute resolution as an alternative way of dispute settlement involving agribusiness entities
12:10	*Iryna Davydova and Alina Artomova* Forecasting innovative changes in managing socio-economic systems
12:20	*Igor Biletskiyi, Natalia Teliura, Daria Lukashevych and Konstantin Mishchenko* Combined Anaerobic and Aerobic Technology for Wastewater Treatment
12:30	*Serghii Perepelytsia* Criminal Law Aspects of Wartime Collaboration in The Criminal Code of Ukraine
12:40	*Nataliia Filatova-Bilous, Tetiana Tsuvina and Bohdan Karnaukh* Digital Platforms' Practices on Content Moderation: Substantive and Procedural Issues Proposed by DSA
12:50	*Ihor Shynkarenko, Oleg Shynkarenko and Andriy Bublikov* Directions of the Formation of The Model of Sustainability of The Aerospace Complex of Ukraine
13:00	*Igor Biletskiyi, Natalia Teliura, Daria Lukashevych and Konstantin Mishchenko* Innovative Biotechnological Methods Treatment of Combined Wastewater
13:10	*Svitlana Gutsu and Hanna Spitsyna* Labor Legislation in The Era of Artificial Intelligence
13:20	*Alla Hordeiuk and Dmytro Kornilov* The Collective Agreement as An Institution of Labour Law and A Regulatory-Legal Agreement of Local Action: Historical and Legal Genesis, Current Status, Development Trends
13:30	*Nataliia Filipenko, Hanna Spitsyna, Olena Agapova and Karina Palkova* The Concept of Comprehensive Security for Higher Educational Institutions: Ukrainian and European Experience
13:40	*Nataliia Filipenko, Serhii Lukashevych, Karyna Salaieva and Anatolij Stepaniyk* Theoretical and Practical Significance Identification of Objects of Preventive Influence in Criminology and Law Enforcement

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13:50	*Nataliia Fedosenko, Anastasiia Kupriianova, Andrii Lubentcov, Vitalii Lyzohub, Ievgen Vasyliev* Force Majeure Circumstances in Aviation Activities
14:00	*Nataliia Filipenko, Viktor Shevchuk, Serhii Lukashevych, Nataliia Yazan, Olena Slipets* Legal and Psychological Principles of Preventing Sexual Violence Against Children: International Experience and Realities of Ukraine
14:10	CLOSING PANEL DEBATES
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