Contents

Preface ..... **XI**
Scientific Programme **1**
Author Index **359**

Keynote

INDICIA: An Assessment Indicator for Healthcare AI Systems that focuses on the Caregiver-Patient Relationship and Algorithmic Transparency
Joël Colloc **5**

Invited Talk

A Inherently Discrete-Time *SIS* of Epidemic Model Spread in a Heterogeneous Population with a Health Function projecting a Closed Unite Interval into Itself
Marcin Choíński **19**

Analytical and Numerical Techniques

Pies with Gradient-Driven Knot Refinement for 2D Stress Analysis
Agnieszka Boltuć and Eugeniusz Zieníuk **29**

A Hybrid PIES-PINN Approach for solving Two-Dimensional Orthotropic Potential Problems
Eugeniusz Zieníuk and Krzysztof Szerszeń **35**

Influence of Selected IFPIES Parameters on Solutions in the Domain
Andrzej Kuźelewski and Eugeniusz Zieniuk **40**

Efficient 2D Elastoplastic Analysis using PIES with Global TELLES Transformation for handling weakly Singular Domain Integrals
Agnieszka Boltuć and Eugeniusz Zieníuk **46**

Advanced Modeling and Algorithmic Techniques for Self-Similar IP Network Traffic Simulation and Performance Evaluation
Izabella V. Lokshina and Cees J. M. Lanting **54**

A SIS–Type Continuous-Time Model of Tuberculosis Spread in a Heterogeneous Population with a Linear and a Bilinear Transmission Function
Marcin Choíński and Sylwia Stachowiak **61**

Contents

Optimization Methodology

Direct Versus Indirect Methods in Singular optimal Control: A Structural Benchmark
Mariusz Bodzioch AND **.....71**

Gradient-Based Switching-Time Optimization for Singular Optimal Control: Locality, Admissibility and PMP Diagnostics
Mariusz Bodzioch**.....77**

Robust Set-Based Design by Monte-Carlo Simulation and Decision Tree
Jean-Yves Dantan **.....81**

Simulation Tools

Quantum Kernels without the Quantum Computer: Demonstrating a Simulation-Based Stylometry Pipeline for Attributing AI-Generated Text
Kalin Kopanov and Tatiana Atanasova **.....91**

A Probabilistic Risk-Ranking Tool for Assessing Food Chain and Environmental Risks of Nitrification Inhibitors in Grazed Pastoral Systems
Vaibhav Bhatia, Patrick Forrestal, Surinder Saggar, Dumsane T. Matse, Marta Alfaro and Enda Cummins**.....96**

AI in Simulation

How a Small Fine-Tuned Model can rival a Large General-Purpose Model in Culinary Tasks
Jan K. Krajewski, Aleksandra Hinc, Leszek J. Chmielewski and Arkadiusz Orłowski **.....101**

Set Transformer for Bundle Recommendation: Modeling Bundles as Sets
Suman Kumar, Aakash Swami and Siddhartha Sarkar**.....106**

Conservative Simulation-Guided Design Exploration using Uncertainty-Aware Graph Neural Network Surrogates
Pancho Dachkinov and **.....111**

Machine Learning

A Machine Learning Approach for Decision Support in Infertility Risk Assessment
Dawid Zamojski, Adam Pudelko, Emilia Morawiec, Anna Bednarska-Czerwinska and Michal Marczyk **.....119**

Contents

Multi-Agent Simulation of Phishing using a Metamodel Integrating Machine Learning for Detection
Moussa Koïta, Mohamed Y. Maize and Oumar Y. Maïga **.....125**

Sequential Linearization for Physics-Informed Extreme Learning Machines: A Benchmark-Motivated Fix for Nonlinear PDE Failures
Karol Struniawski **.....132**

Physics-Informed Extreme Learning Machines for Steady-State Amplified Spontaneous Emission: A Feasibility Study
Karol Struniawski **.....137**

Large Language Models

Dynamic Super-Resolution Strategy for Efficient Scene Text Legibility Classification
Seweryn Kalisz, Michał Marczyk and Rafał Fagas**.....145**

Cross-Lingual Agreement between Text and Speech Emotion Recognition: Towards Robust Multimodal Perception in Social Robots
Kamil Skowroński, Adam Galuszka and Eryka Probierz **.....153**

Exploring OODA Loops through Categorical Formalisation and Executable Aspect Semantics
Ian Oliver and Pekka Kuure **.....161**

Parallel Computing

A Design-Time Archetype Lens for HLA Object Models
Okan Topçu **.....171**

Beyond Single Stream Testing: A Large-Scale Statistical Evaluation of Modern Pseudo-Random Number Generators
Théau Wartel, Loïc Yon, David R.C.Hill and Benjamin Antunes **.....176**

Autonomous Systems

Pathplanning in Dynamic Environments
Matthias Becker and Joel Lienhard**.....187**

Model for Visual Terrain Relative Navigation
Paweł Śliwa**.....192**

Contents

A Particle Swarm Optimization Algorithm for Mobile Robot Path Planning with Hermite Smoothing
Artur Babiarz **.....197**

Development of a Low-Cost Open-Hardware throwable Mobile Robot for Remote Reconnaissance
Krzysztof Jaskot and Dawid Prokop**.....202**

Deep Reinforcement Learning vs. PID Control: A Comparison of Autonomous Navigation of a Blimp in 3D Environment
Tomasz Grzejszczak, Michał Lasak and Maja Rudnicka **.....205**

Engineering Simulation

Learning Strategy for XGBOOST Based Energy Consumption Forecasting of an Injection Molding Machine
Mohammed Charraoui, Rosa Abbou, Alexandre Sava and Julien Launay **.....211**

A Three Degree of Freedom Mathematical Model Representing the Apparent Mass and Fore-and-Aft Cross Axis Apparent Mass of the Human Body exposed to Vertical Vibration
Naser Nawayseh**.....219**

Man-in-The-Loop Simulation

Towards Social Automation: Mathematical Modelling, Simulation and Control of Human Centric Systems
Eryka Probierz **.....229**

Mixed-Model Simulation to Enable Human-Aware Decision-Making in Reconfigurable Manufacturing Systems
Tian Zhang, Jelena Petronijevic, Maroua Ratby, Mustapha Douache, Rémy Balland and Némo Grandidier**.....234**

Agent-Based Simulation of Human Robot Interaction in Assisted Living Environments: Trust, Emotion and Adaptive Robot Behaviour
Eryka Probierz, Anita Gałuszka, Adam Gałuszka and Kamil Skowroński **.....242**

Manufacturing Optimization Simulation

Holonic Control Architecture for Reconfigurable Manufacturing Systems
Sophie Hennequin, Adegoke Adesanmi, Daniel Roy and Ashraf Faraj**.....249**

Using Optimisation Tool for the Design Improvement of Production Systems – An Integrative View of Mathematical Modelling and Design Process
Paul Stief, Meisam Pour Massahian Tafti, Xavier Godot, Ali Siadat, Jean-Yves Dantan, Juan-Camilo Gomez Echeverri and Josselin Schumacker **.....254**

Toward Deep Energy Neural Networks as Surrogates for Mass-Spring Models of Textiles
Sylvain Chabanet, Atal-Anil Kumar, Oriane Dermy and Thibaut Raharijaona**...258**

Simulation in Smart Manufacturing

Towards Smart Industry: A Modular Framework for Adaptive Monitoring of WAAM Systems
Soukaina Sadiki, Sandra Chevret, Paul Stief and Alexandre Sava**.....265**

Scalability Assessment of Reconfigurable Manufacturing Systems under New Product Integration
Leila Khalili Doost Maklavani, Paul Stief, Jean-Yves Dantan and Nathalie Klement**.....269**

Vision-Language Models in Smart Industry: Benchmarking OVOD Architectures for Real-World Deployment
Tomasz Strzoda**.....273**

Industry 5.0 in Production Management Courses: Integration of Operator's Well-Being using Simulation-Based Decision-Making
Jelena Petronijevic, Tian Zhang, Alain Etienne, Jean-Yves Dantan and Ali Siadat**.....278**

Simulation in Logistics

Modelling of Potential Symbiosis Networks based on a Fuzzy Cognitive Map: A Nigeria Case
Adegoke Adesanmi, Daniel Roy and Sophie Hennequin **.....283**

GRADES – A New Graph-Based System Dynamics and Discrete Event Simulation for Business Sector Supply Chains: Part 1: Agriculture
Asharab A. Haider, Johannes A. Koller, Alison Moldovan-Mauer and Dirk Beinert **.....286**

Tackling Transaction Data Scarcity with a Multi-Paradigm Simulation Approach for Supply Chain Networks
Asharab A. Haider, Johannes A. Koller, Alison Moldovan-Mauer and Dirk Beinert **.....290**

Contents

Ontology-based Market Agents: Towards a Dynamic Instantiation of Supply Chain Simulations
Lasse Hammer, Andreas Schäfer, Patrick Westphal, Lorenz Bühmann, Minu Lee, Arlena Wellßow and Eric MSP Veith **.....300**

Simulation and Facility Layout Design for Intelligent Management in Fast Food Restaurants: Reducing Service Times and Maximizing of Operational Efficiency through Discrete-Event Simulation
Estebin Chuquillanqui-Mantari and Rodolfo Chávez-Castillo **.....307**

Emergency Management Simulation

Potential of Artificial Intelligence in Scenario Creation in the Context of Simulations and Training in Disaster Management
Daniel Chovanec, Jozef Ristvej, Jozef Kubás and Vladimír Andrassy **.....313**

A Multi-Sector Network Model for Assessing Critical Infrastructure Resilience
Piotr Stąpor and Ryszard Antkiewicz **.....318**

Optimisation and Stochastic Simulation Methods to Reduce Uncertainty in Assessing the Impact of EDT on Military Operations
Andrzej Najgebauer, Ryszard Antkiewicz, Sławomir Wojciechowski and Dawid Maślanik **.....326**

When Wildfire Breaks the Grid: A Validated Extreme-Event Testbed for Infrastructure Resilience
Eric M.S.P. Veith and Vivian Sultan **.....332**

Mapping the Next Line of Wildfire Defense: GIS-Based REFCL Prioritization in Southern California
Vivian Sultan, Eric MSP Veith, Aristotle Ochoa and Carlos Rodriguez **.....340**

Simulation in Energy Environments

A Calibrated Sub-Stations Building Simulator for District-Heated Residential Buildings and Evaluation of Control Strategies
Christoffer Hansson and Gideon Mbiydzenyuy **.....347**

An Iterative Co-Simulation Pipeline for Coupled Models
Amy Liffey, Khoa Nguyen, Sandro Luh and René Schumann **.....352**