Publications

0.0.1 Refereed Scientific Articles

Journal Articles   Tomáš Poštulka, Daniel Huczala, Grzegorz Orzechowski, Aki Mikkola, Zdenko Bobovský, and Róbert Huňady. "Reducing Energy Consumption in Robotic Processes Using a Single-DOF Bennett Mechanism." *IEEE Access*. 2025. DOI

Peter Manzl, Oleg Rogov, Johannes Gerstmayr, Aki Mikkola, and Grzegorz Orzechowski. "Reliability evaluation of reinforcement learning methods for mechanical systems with increasing complexity." *Multibody System Dynamics*. 2025. DOI

Sachintha Alwis Weerasinghe, Adam Kłodowski, R Scott Semken, Grzegorz Orzechowski, and Aki Mikkola. "Benchmarking adhesive performance in bonding FDM TPU to PBF PA12." *Scientific Reports*. 2025. DOI

Qasim Khadim, Peter Manzl, Emil Kurvinen, Aki Mikkola, Grzegorz Orzechowski, and Johannes Gerstmayr. "Real-time structural dynamics estimation in hydraulically actuated systems using 3D flexible multibody simulation and SLIDE networks." *Mechanical Systems and Signal Processing*. 2025. PDF DOI

Yixuan Tang, Grzegorz Orzechowski, Aleš Prokop, and Aki Mikkola. "Monte Carlo Tree Search Control Scheme for Multibody Dynamics Applications." *Nonlinear Dynamics*. 2024. DOI

Qasim Khadim, Emil Kurvinen, Aki Mikkola, and Grzegorz Orzechowski. "Simulation-Driven Universal Surrogates of Coupled Mechanical Systems: Real-Time Simulation of a Forestry Crane." *Journal of Computational and Nonlinear Dynamics*. 2024. DOI

Seongji Han, Grzegorz Orzechowski, Jin-Gyun Kim, and Aki Mikkola. "Data-driven friction force prediction model for hydraulic actuators using deep neural networks." *Mechanism and Machine Theory*. 2024. DOI

Arash Hashemi, Grzegorz Orzechowski, Aki Mikkola, and John McPhee. "Multibody Dynamics and Control Using Machine Learning." *Multibody System Dynamics*. 2023. DOI

Grzegorz Orzechowski, José L. Escalona, Oleg Dmitrochenko, Narges Mohammadi, and Aki M. Mikkola. "Modeling Viscous Damping for Transverse Oscillations in Reeving Systems Using the Arbitrary Lagrangian–Eulerian Modal Approach." *Journal of Sound and Vibration*. 2022. DOI

Adam Kłodowski, Ilya Kurinov, Grzegorz Orzechowski, and Aki Mikkola. "Simulating human motion using Motion Model Units – example implementation and usage." *Archive of Mechanical Engineering*. 2022. DOI

Hee-Sun Choi, Junmo An, Seongji Han, Jin-Gyun Kim, Jae-Yoon Jung, Juhwan Choi, Grzegorz Orzechowski, Aki Mikkola, and Jin Hwan Choi. "Data-Driven Simulation for General-Purpose Multibody Dynamics Using Deep Neural Networks." *Multibody System Dynamics*. 2021. DOI

Ilya Kurinov, Grzegorz Orzechowski, Perttu Hämäläinen, and Aki Mikkola. "Automated Excavator Based on Reinforcement Learning and Multibody System Dynamics." *IEEE Access*. 2020. DOI

Grzegorz Orzechowski, Perttu Hämäläinen, and Aki Mikkola. "Force approximation of the human hand in contact with a climbing wall handle." *Archive of Mechanical Engineering*. 2020. DOI

Xinxin Yu, Oleg Dmitrochenko, Marko K Matikainen, Grzegorz Orzechowski, and Aki Mikkola. "Cone Complementarity Approach for Dynamic Analysis of Multiple Pendulums." *Advances in Mechanical Engineering*. 2019. DOI

Grzegorz Orzechowski, Janusz Frączek, and Tomasz Barczak. "Physical Experiment and Computer Simulation of the Speed-up Manoeuvre Using the Absolute Nodal Coordinate Formulation."

Proceedings of the Institution of Mechanical Engineers, Part K: Journal of Multi-body Dynamics. 2018. DOI

José L. Escalona, Grzegorz Orzechowski, and Aki M. Mikkola. "Flexible Multibody Modeling of Reeving Systems Including Transverse Vibrations." *Multibody System Dynamics*. 2018. DOI

Agnieszka Niemierzycka, Krzysztof Tomczuk, Mirosław Mikicin, Agnieszka Zdrodowska, Grzegorz Orzechowski, and Marek Kowalczyk. "Examinations of the methods used to power supply of different light sources and their effect on bioelectrical brain activity." *Neurologia i Neurochirurgia Polska*. 2018. DOI

Grzegorz Orzechowski, Marko K. Matikainen, and Aki M. Mikkola. "Inertia Forces and Shape Integrals in the Floating Frame of Reference Formulation." *Nonlinear Dynamics*. 2017. DOI

Grzegorz Orzechowski and Janusz Frączek. "Volumetric locking suppression method for nearly incompressible nonlinear elastic multi-layer beams using ANCF elements." *Journal of Theoretical and Applied Mechanics*. 2017. DOI

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Grzegorz Orzechowski and Ahmed A Shabana. "Analysis of Warping Deformation Modes Using Higher Order ANCF Beam Element." *Journal of Sound and Vibration*. 2016. DOI

Grzegorz Orzechowski and Janusz Frączek. "Nearly Incompressible Nonlinear Material Models in the Large Deformation Analysis of Beams Using ANCF." *Nonlinear Dynamics*. 2015. DOI

Mirosław Mikicin, Grzegorz Orzechowski, Katarzyna Jurewicz, Katarzyna Paluch, Marek Kowalczyk, and Andrzej Wróbel. "Brain-training for physical performance: a study of EEG-neurofeedback and alpha relaxation training in athletes." *Acta Neurobiologiae Experimentalis*. 2015.

Grzegorz Orzechowski and Janusz Frączek. "Integration of the Equations of Motion of Multibody Systems Using Absolute Nodal Coordinate Formulation." *Acta Mechanica et Automatica*. 2012.

Grzegorz Orzechowski. "Analysis of beam elements of circular cross section using the absolute nodal coordinate formulation." *Archive of Mechanical Engineering*. 2012. DOI

Book Sections   Emil Kurvinen, Iines Suninen, Grzegorz Orzechowski, Jin H. Choi, Jin-Gyun Kim, and Aki Mikkola. "Accelerating design processes using data-driven models." *Real-time Simulation for Sustainable Production*. 2021.

Conference Proceedings   Qasim Khadim, Lauri Pyrhönen, Emil Kurvinen, Johannes Gerstmayr, Aki M. Mikkola, and Grzegorz Orzechowski. "Real-Time State Estimation of Hydraulically-Driven Systems Based on Unscented Kalman Filter and Low-Fidelity Models." *Proceedings of the ASME 2024 International Design Engineering Technical Conferences & Computers and Information in Engineering Conference IDETC/CIE 2024*. 2024. DOI

Qasim Khadim, Emil Kurvinen, Aki M. Mikkola, and Grzegorz Orzechowski. "Efficient and Accurate Real-Time Simulations of Coupled Mechanical Systems Using the Universal Hydraulic Surrogate." *Proceedings of the ASME 2023 International Design Engineering Technical Conferences & Computers and Information in Engineering Conference IDETC/CIE 2023*. 2023. DOI

Michał Wychowański, Grzegorz Sługocki, Grzegorz Orzechowski, Zbigniew Staniak, and Dariusz Radomski. "Results of Single Sculling Technique Analysis Using 1D Mathematical Model." *IFAC-PapersOnLine*. 2018.

Grzegorz Orzechowski, Aki M. Mikkola, and José L. Escalona. "Co-Simulation Procedure for Multibody Reeving Systems." *Proceedings of the ASME 2018 International Design Engineering Technical Conferences & Computers and Information in Engineering Conference IDETC/CIE 2018.* 2018.

Grzegorz Orzechowski and Aki M. Mikkola. "In-Extensible ANCF Cable Element for Real-Time Simulations." *ECCOMAS Thematic Conference on Multibody Dynamics.* 2017.

Grzegorz Orzechowski and Aki M. Mikkola. "Boundary Conditions and Craig-Bampton Substructuring Technique with Free-Free Modes." *Proceedings of the ASME 2017 International Design Engineering Technical Conferences & Computers and Information in Engineering Conference IDETC/CIE 2017.* 2017.

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0.0.2 Non-Refereed Scientific Articles

Oleg Rogov, Peter Manzl, Johannes Gerstmayr, Arto Liuha, and Grzegorz Orzechowski. "Reinforcement Learning in Mechanical Systems: Integration of Continuous Control and Curriculum Learning." *ASME 2024 International Design Engineering Technical Conferences & Computers and Information in Engineering Conference IDETC/CIE 2024.* 2024.

Oleg Rogov, Arto Liuha, and Grzegorz Orzechowski. "Modern Approaches to Autonomous Excavation: A Literature Survey." *Finnish Mechanics Days.* 2024.

Yixuan Tang, Grzegorz Orzechowski, and Aki M. Mikkola. "Monte Carlo Tree Search Control Scheme for the Inverted Pendulum." *ECCOMAS Thematic Conference on Multibody Dynamics.* 2023.

Oleg Rogov, Peter Manzl, Johannes Gerstmayr, and Grzegorz Orzechowski. "Reinforcement Learning Methods for Multibody Systems Evaluated with Controlled Multi-Link Inverted Pendulum on the Cart." *ECCOMAS Thematic Conference on Multibody Dynamics.* 2023.

Qasim Khadim, Grzegorz Orzechowski, Emil Kurvinen, and Aki Mikkola. "Numerical Optimization of Parameters Using the Covariance Matrix Adaptation Evolution Strategy in the Coupled Multibody Systems." *ECCOMAS Thematic Conference on Multibody Dynamics.* 2023.

Seongji Han, Grzegorz Orzechowski, Jin-Gyun Kim, and Aki Mikkola. "A Data-Driven Metamodeling Technique for Friction Force in Hydraulic Actuators." *Annual Meeting of the Korean Society of Mechanical Engineers.* 2023.

Grzegorz Orzechowski and Aki M. Mikkola. "High-fidelity Multibody Systems in Model-based Control Applications." *IUTAM Symposium on Optimal Design and Control of Multibody Systems.* 2022.

Grzegorz Orzechowski, Perttu Hämäläinen, and Aki M. Mikkola. "Force Approximation of the Hand on the Climbing Wall Handle." *ECCOMAS Thematic Conference on Multibody Dynamics.* 2019.

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Grzegorz Orzechowski and Janusz Frączek. "Modeling of multilayer beams using the Absolute Nodal Coordinate Formulation." *ECCOMAS Thematic Conference on Multibody Dynamics.* 2015.

Grzegorz Orzechowski, Janusz Frączek, and Krzysztof Arczewski. "Nonlinear incompressible material

models for beam elements in absolute nodal coordinate formulation." *ECCOMAS Thematic Conference on Multibody Dynamics*. 2013.

Grzegorz Orzechowski and Janusz Frączek. "Beam element of circular cross section based on the ANCF continuum mechanics approach." *ECCOMAS Thematic Conference on Multibody Dynamics*. 2011.

Grzegorz Orzechowski and Janusz Frączek. "Modeling of the beam elements with variable cross section thickness using absolute nodal coordinate formulation (in Polish)." *12th Scientific-Technical Conference Computational Techniques in Engineering*. 2011.

Grzegorz Orzechowski and Janusz Frączek. "Modeling of the beams with taper cross section using absolute nodal coordinate formulation." *19th International Conference on Computer Methods in Mechanics*. 2011.

Tomasz Krawczyk, Grzegorz Orzechowski, and Janusz Frączek. "Simulation studies of dynamics of the robot flexible power transmission (in Polish)." *10th Anniversary Scientific-Technical Conference, FEA programs in analysis, design and manufacturing*. 2007.

0.0.3 Scientific Books (Monographs)

Special Issue of a Journal Johannes Gerstmayr, Grzegorz Orzechowski, and Alessandro Tasora. "Special Issue on Artificial intelligence within multibody system dynamics." *Multibody System Dynamics*. 2024. Link

Pierpaolo Belardinelli, Kiran X. D'Souza, Grzegorz Orzechowski, and Hiroyuki Sugiyama. "Special Issue: Selected Papers From 2023 Multibody Systems, Nonlinear Dynamics, and Control Conference." *ASME Journal of Computational and Nonlinear Dynamics*. 2023. DOI

0.0.4 Theses

Grzegorz Orzechowski. "Modeling of flexible multibody systems in absolute nodal coordinate formulation." 2012.