POLITECHNIKA Czestochowa University of Technology

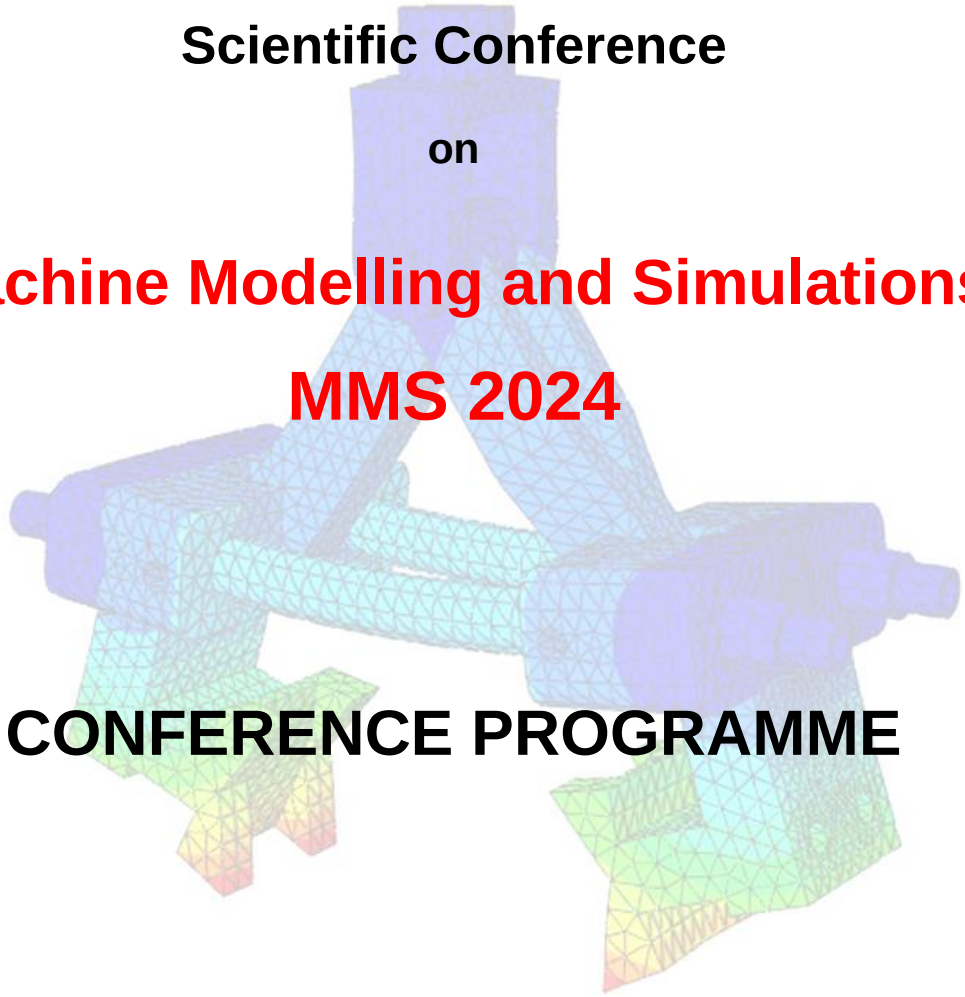
Faculty of Mechanical Engineering and Computer Science

29th Polish - Slovak Scientific Conference

on

Machine Modelling and Simulations

MMS 2024



CONFERENCE PROGRAMME

3 – 6 September, 2024
Hotel Kmicic Belvedere & SPA, Złoty Potok, Poland

Conference Schedule

MMS 2024
Machine Modelling and Simulations

Tuesday 3.09.2024

11:00 - 13:00 – Registration of participants
13:00 - 14:00 – Lunch
14:30 - 15:00 – Opening Ceremony
15:00 - 16:00 – Invited Lectures
16:00 - 16:30 – Official photo and coffee break
16:45 - 18:15 – Lectures – Sessions A1, B1
19:00 – Dinner

Wednesday 4.09.2024

8:00 - 9:00 – Breakfast
9:00 - 10:30 – Lectures – Sessions A2, B2
10:30 - 11:00 – Coffee break
11:00 - 12:30 – Lectures – Sessions A3, B3
13:00 - 14:00 – Lunch
15:00 - 16:30 – Lectures – Sessions A4, B4
19:00 – Gala dinner

Thursday 5.09.2024

8:00 - 9:30 – Breakfast
11:00 - 12:30 – Lectures – Sessions A5, B5
13:00 - 14:00 – Lunch
14:30 - 17:30 – Landscape tour
17:30 - 18:30 – Meeting of Scientific Committee
19:00 – Grill party

Friday 6.09.2024

8:00 - 9:00 – Breakfast
9:00 - 10:30 – Lecture – Session A6
10:30 - 11:00 – Closing of the conference
12:00 – Lunch

September 3th, Tuesday

11:00 – 13:00 **Registration of participants**

13:00 – 14:00 **Lunch**

14:30 – 15:00 **Opening Ceremony**

15:00 – 16:00 **Invited Lectures**

Chairman: *Prof. Darina Ondrušová, Prof. Dawid Cekus*

Engineering of machinery, equipment, computer-aided processing systems and processes
Marek Macko

The load on the supporting structure of the gantry crane when moving along the crane track
Ján Vavro, Ján Vavro jr., Ľuboš Marček, Jana Kuricová, Miloš Taraba, Lukáš Klimek, Pavol Čerňava

16:00 – 16:30 **Official photo / Coffee break**

16:45 – 18:15 **Lectures – Sessions A1, B1**

Session A1 **Modeling and simulation, structural optimization**

Chairman: *Prof. Mariana Pajtášová, Prof. Grzegorz Domek*

Estimation of effective parameters for plasticization in butt welding of drive belts
Krzysztof Wałęsa, Krzysztof Talaśka, Dominik Wilczyński

Selection of parameters of key components for emission-free power system of maintenance rail vehicle
Maksymilian Cierniewski, Patryk Radziszewski, Karol Bryk

Selection of parameters of the hydrogen power system for a passenger rail vehicle
Patryk Radziszewski, Maksymilian Cierniewski, Karol Bryk

Influence of the control points position on the accuracy of heat transfer coefficient selection
Robert Dyja, Elżbieta Gawrońska, Maria Zych

Heat transfer coefficient optimization using artificial intelligence algorithms: accuracy and computational efficiency analysis
Maria Zych, Robert Dyja, Elżbieta Gawrońska

Session B1 — Experimental mechanics, identification and validation

Chairman: *Prof. Elżbieta Gawrońska, Prof. Ján Vavro*

Non-destructive approaches to assessing CFRP bicycle frame integrity
Lucia Deganová, Vladimír Dekýš, Milan Sapieta, Jaroslav Miškolci

Comparison of dissipation energy in PLA, ABS and PETG materials used in 3D printing
Barbora Drvárová, Lucia Deganová, Pavol Novák, Jaroslav Zapoměl, Vladimír Dekýš

The analysis of the actual surface structure and functional parameters of materials after mechanical processing
Piotr Boral

Identification and analysis of motion dynamics of an electric scooter type device based on calculations used to build an electric scooter frame adapted for high speeds
Krzysztof Michalski, Jan Górecki

The influence of additional mass elements on the acoustic spectrum of the bell
Dawid Cekus, Maciej Nadolski, Sebastian Garus

19:00 Dinner

September 4th, Wednesday

8:00 – 9:00 **Breakfast**

9:00 – 10:30 **Lectures – Sessions A2, B2**

Session A2

Modeling and simulation, structural optimization

Chairman: *Prof. Michał Bembenek, Prof. Przemysław Moczko*

Methodology of welding of timing belt
Michał Wilczyński, Grzegorz Domek, Dominik Wilczyński

Fruit classification by assessing slice hardness based on RGB imaging: case study: apple slices
Bashar S. Falih, Łukasz Gierz, Mustafa A. J. Al-Sammarraie

Progressive design of the take-up bar within the jet weaving machine for the production of 3D fabrics
Tomáš Koňařík, Karel Ráž

Numerical analysis using the DEM method of the influence of the inclination of the dosing unit in terms of the sowing dose of granular material
Wiktor Jan Łykowski

Physical and mechanical characterization of injection moulded parts from recycled polyethylene packaging caps
Paweł Palutkiewicz, Adam Gnatowski

Model for identification of stress state in parts manufactured 3D-printing technique and applied in the exoskeleton to rehabilitation of lower limbs
Elżbieta Gawrońska, Szczepan Śpiewak

Session B2

Methods and systems in machine design, CAD, CAM, CAE

Chairman: *Prof. Elżbieta Gawrońska, Prof. Piotr Krawiec*

Validation of a CAE tool based on Chris Rauwendaal's model for the design of spiral mandrel dies that ensures uniformity of extruded film thickness
Paweł Cyprys, Marek Macko

Modernization of the film blowing head using CAD/CAE tools
Marek Macko, Paweł Cyprys

Analysis of the functional characteristics of a wheelchair
Mateusz Kukla, Michał Kończak, Łukasz Warguła, Bartosz Wieczorek

Optimization of vibration transfer through Headexpander-Fixture interfaces using nonlinear FEA for accurate vibration prediction
Grzegorz Waldemar Ślaski, Mikołaj Spadło

Validation of the dynamics model of a four-wheeled mobile platform
Anna Agata Jaskot, Bogdan Posiadała

Fine-tuning of the oscillation frequency in slender mechanical beam-systems through the use of smart materials features
Krzysztof Kuliński, Krzysztof Sokół

10:30 – 11:00 Coffee break

11:00 – 12:30 Lectures – Sessions A3, B3

Session A3

Modelling of structural materials, composites and nanomaterials

Chairman: *Prof. Janusz Mielniczuk, Prof. Vladimír Dekýš*

Dimensional accuracy of photo-curing (LCD) microprinting
Łukasz Kowalski, Michał Bembenek

Limit load capacity of elements with porous structure
Maciej Berdychowski, Janusz Mielniczuk

Analysis of the influence of time and type of ageing on changes in the physical properties of poly(oxymethylene) (POM) samples
Aleksandra Kalwik, Przemysław Postawa

Analysis of the influence of the position of the castor wheels on the ability to put the trolley in motion
Łukasz Warguła, Bartosz Wieczorek, Łukasz Gierz

Advanced optical methods in analysis of flow around an airfoil with a circular microcylinder
Karolina Monika Gajewska, Renata Gnatowska

Advancing the dynamic properties of a column with variable flexural stiffness in terms of structural mounting damping and internal damping
Anna Jurczyńska

Session B3

Advanced industrial applications

Chairman: *Prof. Wiesława Piekarska, Prof. Alžbeta Sapietová*

Modeling the properties of a timing belt using 3D printing for advanced applications
Grzegorz Domek, Marcin Kempiński, Piotr Kotlarz, Elżbieta Gawrońska, Krzysztof Tyszczuk, Mateusz Domeracki

Modeling of co-combustion of butanol with diesel fuel in a dual-fuel compression ignition engine
Arkadiusz Jamrozik

Research of electrical conductivity in toothed belts with steel cords for electrical signal transmission functionality
Grzegorz Śmigielski, Piotr Krawiec, Grzegorz Domek, Andrzej Kołodziej

Numerical analysis of the Fuel-Air mixture formation process in a Dual-Fuel engine cylinder
Wojciech Tutak

The research on the force required to slide a wheelchair uphill – empirical study in relation to a theoretical model
Bartosz Wieczorek, Łukasz Warguła, Boris Kostov

The influence of temperature on the physical and structural properties of X37 CrMoV5-1 steel, numerical model and experimental research
Tomasz Domański, Marcin Kubiak, Zbigniew Saternus

13:00 – 14:00 Lunch

15:00 – 16:30 Lectures – Sessions A4, B4

Session A4

Modeling and simulation, structural optimization

Chairman: *Prof. Marek Macko, Prof. Milan Vasko*

Numerical modeling of the bronze solidification process with consideration of the influence of an air gap between the mold and the casting
Tomasz Skrzypczak, Leszek Sowa

Numerical modelling of basic physical phenomena of the cast slab solidification process at the initial stage of the continuous casting process
Leszek Sowa

Kinematic simulation of the ball mill using 3D CAD modeling
Adam Zabrowarny

Assessment of multiaxial fatigue life of technical components by the finite element method
Katarína Pijáková, Milan Sága

Testing and modelling of tire stiffness and contact patch size under varying inflation pressures and vertical load across various tire sizes
Grzegorz Waldemar Ślaski, Konrad Jan Waluś

Local instability of sandwich panel with a core of non-linear physical properties
Jolanta Pozorska, Zbigniew Pozorski

Session B4

Physical and chemical properties of materials

Chairman: *Prof. Damian Pietrusiak, Prof. Bartosz Wieczorek*

Vibrations and stability of a column loaded with a follower force directed towards the negative pole taking into account its stiffness discontinuities
Sebastian Uzny, Krzysztof Sokół, Tadeáš Ochodek

The influence of alternative fillers on the preparation process and properties of new elastomeric blends for industrial use
Ivan Labaj, Darina Ondrušová, Juliána Vršková, Mariána Pajtášová, Slavomíra Božeková

The effect of a biodegradable filler based on walnut shell crumbs on the properties of polymer composites
Juliána Vršková, Darina Ondrušová, Ivan Labaj, Andrej Dubec, Ivan Kopal, Mariana Pajtášová

The effect of hardness on the amplitude of Barkhausen noise
Marek Makuch, Jan Krmela, Vladimíra Krmelová, Martina Fusková

Effect of moisture on mechanical properties of additively manufactured thermoplastic composites
Jaroslav Majko, Milan Vaško, Marián Handrik

Utilization of microwave irradiation for chemical treatment of natural kaolin and its use in the rubber composites
Darina Ondrušová, Andrea Feriancová, Jana Šulcová, Jana Pagáčová, Iveta Papučová, Katarína Moricová, Maroš Dedinský

19:00 Gala dinner

September 5th, Thursday

8:00 – 9:30 **Breakfast**

11:00 – 12:30 **Lectures – Sessions A5, B5**

Session A5

Machine dynamics and multibody systems simulations

Chairman: *Prof. Piotr Boral,*
Prof. Grzegorz Waldemar Ślaski

Dynamic analysis of the wheel suspension arm
Milan Sapieta

3D printing technology as the manufacturing method of complex exoskeleton elements carrying heavy loads
Dawid Cekus, Tomasz Domański, Marcin Skotniczny

Application of mathematical models for the analysis of thermal phenomena in welding process using Abaqus software
Zbigniew Saternus, Tomasz Domański, Marcin Kubiak

The problem of vertical vibration of vehicles
František Klimenda, Blanka Skočilasová, Pavol Novák, Alžbeta Sapietova

Study of the stability of wheelchairs due to the location of the center of gravity
Michał Kończak, Mateusz Kukla

Kinematic synthesis of the Gough-Stewart platform in MSC.ADAMS and Matlab
Alžbeta Sapietová

Session B5

Physical and chemical properties of materials

Chairman: *Prof. Marcin Kubiak, Prof. Krzysztof Talaśka*

Determination of the influence of selected external factors on the physical and structural properties of UHMWPE
Marcin Nabrdalik, Michał Sobociński

Energy absorption capabilities of integral helmets made of selected polymers
Piotr Paszta

The effect of plasma treatment on microstructure, roughness and curing of rubber blend
Mariana Pajtášová, Silvia Ďurišová, Darina Ondrušova, Zuzana Mičicová, Slavomíra Božeková, Ivan Labaj, Róbert Janík, Simona Lokšíková

Experimental study on the mechanical properties of machine parts made using 3D printing technology
Dominik Wojtkowiak

Effective technology for flow parameters adjustment of axial fans – project ETAF
Przemysław Moczko, Ivan Kuric, Marek Macko, Piotr Odyjas, Damian Pietrusiak, Milan Saga, Andrzej Szczepańczyk, Zbigniew Szczepański, Mariusz Śliwiński, Kamil Urbański, Milan Vasko, Jędrzej Więckowski

Parameter estimation of Weibull probability distribution by seven methods – a wind regime of the city Nitra, Slovakia
Ivana Pobočíková, Zuzana Sedliačková, Mária Michalková, Daniela Jurášová

13:00 – 14:00 Lunch

14:30 – 17:30 Landscape tour

17:30 – 18:30 Meeting of Scientific Committee

19:00 Grill party

September 6th, Friday

8:00 – 9:00 **Breakfast**

9:00 – 10:30 **Lecture – Session A6**

Session A6 ***Theoretical and applied mathematics and physics in engineering***

Chairman: *Prof. Dawid Cekus, Prof. Łukasz Gierz*

A note on the mathematical model of machine vibration
Božena Dorociaková, Radoslav Chupáč, Rudolf Olach

Modeling of the aluminum alloy chips densification process
Krzysztof Talaśka, Dominik Wilczyński, Krzysztof Wałęsa, Dominik Wojtkowiak

Modelling of laser beam welding using innovative laser with single-mode core surrounded by multi-mode ring
Marcin Kubiak, Tomasz Domański, Zbigniew Saternus

Finite element analysis of the single shear piercing punch performance for belt perforation
Dominik Wojtkowiak, Krzysztof Talaśka

The analytical-numerical methods of predicting the mechanical properties of welded joints made of steel
Zbigniew Saternus, Wiesława Piekarska, Tomasz Domański, Marcin Kubiak

Modelling the evolution of microstructure during recrystallization
Tomasz Walasek

10:30 – 11:00 **Closing of the conference**

12:00 **Lunch**