# 27$^{th}$ Polish-Slovak Scientific Conference
# on
# *Machine Modelling and Simulations*
# *MMS 2022*

Rydzyna, 5-8 September 2022
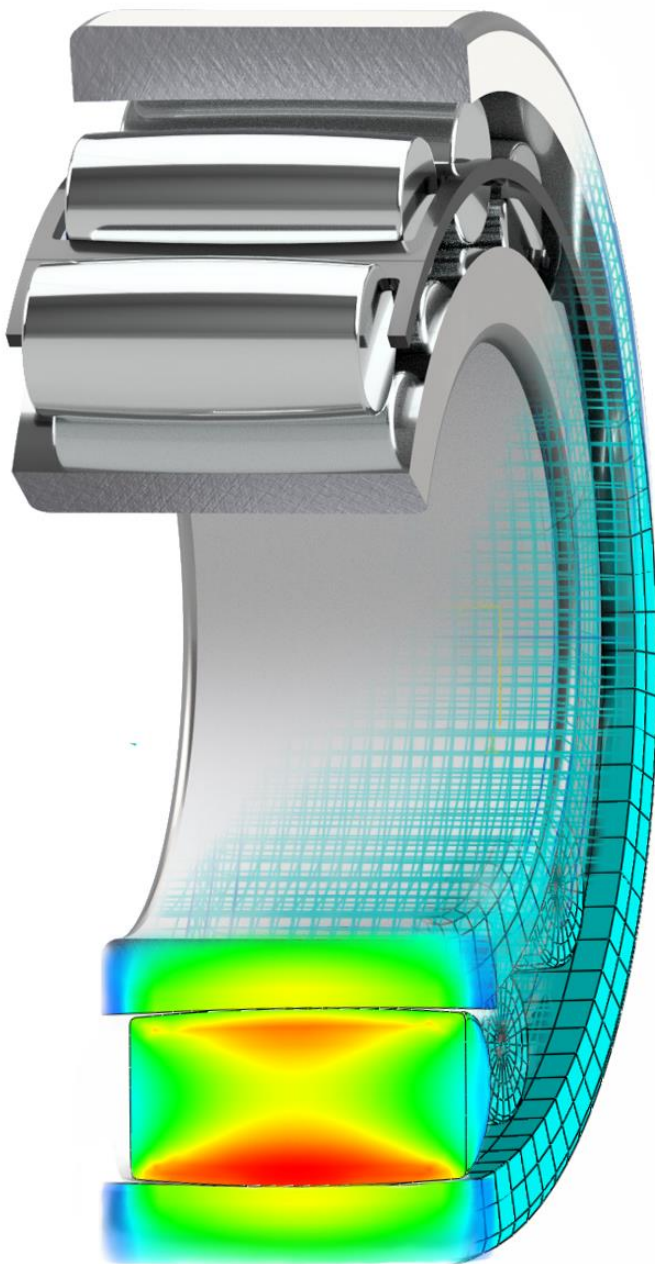
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PhD Eng. Dominik Wojtkowiak

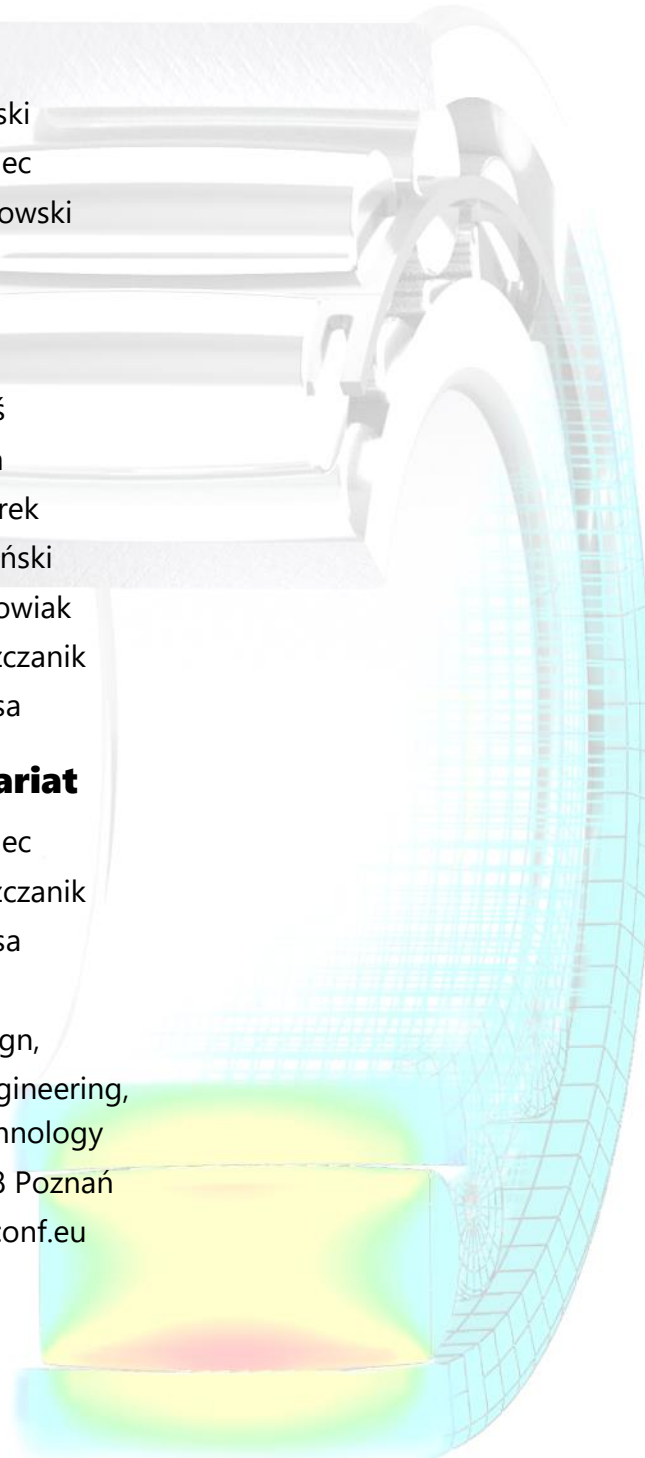MSc Eng. Aleksandra Biszczanik

MSc Eng. Krzysztof Wałęsa

## Conference Secretariat

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MSc Eng. Aleksandra Biszczanik

MSc Eng. Krzysztof Wałęsa


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## Monday 5.09.2022

10:00 - 12:30 – Registration of participants

12:30 - 13:30 – Lunch

14:00 - 14:30 – Opening Ceremony

14:30 - 15:30 – Invited Lectures

15:30 - 16:15 – Official photo and Coffee break

16:15 - 17:45 – Lectures – Sessions A1, A2

18:15 - 19:45 – Sightseeing of Rydzyna Castle

19:45 - 21:00 – Dinner

## Tuesday 6.09.2022

8:00 - 9:00 – Breakfast / Registration of participants

9:00 - 10:30 – Lectures – Sessions B1, B2, B3

10:30 - 11:00 – Coffee break

11:00 - 12:30 – Lectures – Sessions C1, C2, C3

13:00 - 14:00 – Lunch

14:30 - 16:00 – Lectures – Sessions D1, D2, D3

16:30 - 18:00 – Meeting of Scientific Committee

19:00 – Gala dinner

## Wednesday 7.09.2022

8:00 - 9:00 – Breakfast / Registration of participants

9:00 - 16:00 – Presentation of the historical and cultural achievements of Poznań and Poznan University of Technology

16:00 - 17:00 – Lunch

17:30 - 18:30 – Lectures – Sessions E1, E2, E3

19:00 – Grill party

## Thursday 8.09.2022

8:00 - 9:00  – Breakfast

9:00 - 10:30 – Lectures – Sessions F1, F2, F3

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

11:00 - 12:30 – Lunch

**Invited Lectures: Monday, 05/09/2022, at 14:30 - 15:30**

Chairmen: Prof. Olaf **Ciszak**, Prof. Milan **Sága**

1. Assoc. Prof. Jan **Krmela**
   *Polymer composites - interaction between testing and computational simulations*
2. Prof. Michał **Bembenek**
   *The use of thermography as a tool to study the process of pressure agglomeration*

**Session A1: Monday, 05/09/2022, at 16:15 - 17:45** *"Methods and systems in machine design"*

Chairmen: Prof. Grzegorz **Domek**, Prof. Darina **Ondrušová**

1. Kacper **Fiedurek**, Paweł **Szroeder**, Marek **Macko**, Aneta **Raszkowska-Kaczor**, Marcin **Borowicz**, Natalia **Puszczykowska**
   *Introduction to modeling the correlation between grain sizes of feed material and the structure, efficiency of the process of co-rotating twin-screw extrusion of non-flammable composites with a PLA matrix*
2. Łukasz **Gierz**, Weronika **Kruszelnicka**, Krzysztof **Przybył**
   *Design and FEM strength analysis of an innovative and pro-ecological structure of dressing machine*
3. Piotr **Krawiec,** Łukasz **Warguła**, Piotr **Kaczmarzyk**, Olga **Zharkevich**
   *Influence of the value of the tension force of the belt transmission with a V-belt on the value of the transmitted mechanical power*
4. Silvia **Maláková**
   *GPS application in the design of gearboxes*
5. Krzysztof **Tyszczuk**, Grzegorz **Śmigielski**
   *Study on the effect of knife edge construction on oilseed grinding efficiency*

**Session A2: Monday, 05/09/2022, at 16:15 - 17:45** *"Modelling and simulation, structural optimization"*

Chairmen: Prof. Krzysztof **Talaśka**, Prof. Alžbeta **Sapietová**

1. Dominik **Wojtkowiak**, Karol **Konecki**
   *Thermal-displacement simulation and stress analysis of the gear transmission*
2. Miroslav **Blatnický**, Ján **Dižo**, Denis **Molnár**
   *Development of a numerical model of a reference vehicle for monitoring the characteristics of changes in wheel camber under spring compression*

3. Milan **Sága**, Milan **Vaško**, Zuzana **Ságová**, Marian **Handrik**, Lenka **Jakubovičová**, Peter **Kopas,** Jaroslav **Majko**
   *Discrete optimization of truss and beam structures subjected to fatigue life*
4. Elżbieta **Gawrońska**, Robert **Dyja**, Maria **Zych**, Grzegorz **Domek**
   *Selection of the heat transfer coefficient using swarming algorithms*
5. Karel **Ráž**, Zdeněk **Chval**, Martin **Štěpánek**
   *Mechanical analysis of the newly developed 3D printed prosthetic socket from PA12GB*

**Session B1: Tuesday 06/09/2022, at 9:00 - 10:30** *"Methods and systems in machine design"*

Chairmen: Assoc. Prof. Vladimir **Dekýš**, Prof. Marcin **Kubiak**

1. Maciej **Bodnicki**
   *Modeling a force measurement in test stand for testing a rehabilitation robot*
2. Łukasz **Warguła**, Mateusz **Kukla**, Jonas **Matijošius**
   *Mechanical transmission in wheelchairs – an overview and proposal of an innovative concept*
3. Andrzej **Kołodziej**, Karol **Konecki**, Dominik **Wojtkowiak**, Krzysztof **Talaśka**
   *Issues related to the reconstruction of the geometry of the DP6 inch cylindrical gear in the context of reverse engineering using conventional techniques and measuring instruments*
4. Cezary **Czachorowski**, Dominik **Wilczyński**
   *Simulation studies of mechanical drum pedal geometry adjustment characteristics*
5. Nadiia **Artyukhova**, Jan **Krmela**, Vladimíra **Krmelová**, Artem **Artyukhov**, Dastan **Ospanov**
   *Development of a technological package "drying unit": from design to marketing strategy*
6. Artem **Artyukhov**, Jan **Krmela**, Vladimíra **Krmelová**, Nadiia **Artyukhova**, Dastan **Ospanov**
   *Vortex type granulation machines: technological basis of calculation and implementation roadmap*

**Session B2: Tuesday 06/09/2022, at 9:00 - 10:30** *"Modelling and simulation, structural optimization"*

Chairmen: Prof. Elżbieta **Gawrońska**, Prof. Jozef **Svetlík**

1. Krzysztof **Talaśka**, Dominik **Wilczyński**, Dominik **Wojtkowiak**, Grzegorz **Domek**
   *Distribution of stress in the cross-section of a flat steel conveyor belt*

2. Zdenek **Chval**, Karel **Ráž**, Martin **Štěpánek**, Rita **Firýtová**
   *New innovative methods in the field of prosthetics using additive technologies*
3. Lenka **Jakubovičová**, Peter **Kopas**, Milan **Vaško**, Marian **Handrik**
   *Structural design and stress analysis of a shelter for road vehicles*
4. Marián **Handrik**, Milan **Vaško**, Jaroslav **Majko**, Peter **Kopas**, Lenka **Jakubovičová**
   *Analysis of the car impact on the traffic sign*
5. Milan **Vaško**, Zuzana **Ságová**, Ivana **Klačková**, Milan **Sága**
   *Application of the FSD Algorithm for Design of Vehicle Frames from the Point of Safe Operation*

**Session B3: Tuesday 06/09/2022, at 9:00 - 10:30** *"Advanced industrial, automotive and green energy application" & "Theoretical and applied mathematics in engineering"*

Chairmen: Prof. Jarosław **Markowski**, Prof. Mariana **Pajtášová**

1. Maksymilian **Cierniewski**, Wojciech **Jakuszko**, Janusz **Mielniczuk**
   *Main circuit concept for a hybrid rail vehicle*
2. Andrej **Czán**, Jozef **Holubjak**, Tatiana **Czánová**, Miroslav **Cedzo**, Vladimir **Bechny**
   *Analysis of a structural element created by the process of atomic diffusion by additive manufacturing (ADAM) based on austenitic steels*
3. Ireneusz **Dziubek**, Katarzyna **Doberstein-Ganszer**
   *Production and use of biomass in Poland as a guarantee of the national security system*
4. Dorota **Czarnecka-Komorowska**, Swain **Chandra**, Bogdan **Kopeć**, Jacek **Borowski**
   *Development of an innovative wheel arch system for trucks with a "no clogging" function, allowing the removal of snow and slush*
5. Mária **Michalková**, Ivana **Pobočíková**
   *Time series analysis of fossil fuels consumption in Slovakia by ARIMA model*

**Session C1: Tuesday 06/09/2022, at 11:00 - 12:30** *"Experimental mechanics, identification and validation" & "Machine dynamics and multibody systems simulations"*

Chairmen: PhD Eng. Konrad J. **Waluś**, Assoc. Prof. Vladimíra **Krmelová**

1. Robert **Zalewski**
   *Various types of innovative "smart" dampers made of Vacuum Packed Particles*
2. Martin **Hagara**, Miroslav **Pástor**, Jozef **Bocko**
   *Processing potential and analysis of aspects influencing the results of analyses performed by Digital Image Correlation*

3. Krzysztof **Wałęsa**, Jan **Górecki**, Aleksandra **Biszczanik**
   *The study of measuring the density of carbon dioxide at the solid-state using the hydrostatic method*
4. Jaroslav **Majko**, Ondrej **Štalmach**, Milan **Vaško**, Marián **Handrik**, Milan **Sága**
   *Analysis of mechanical properties of additively produced composite structures loaded in bending*
5. Vladimir **Dekýš**, Pavol **Novak**, Dominik **Biro**, Alžbeta **Sapietová**
   *Contribution to the measurement of pipeline deformations*
6. Jacek **Ostrowski**, Maksymilian **Cierniewski**, Janusz **Mielniczuk**
   *Elements of bogies as a source of signals for the radial guidance of a rail vehicle*

**Session C2: Tuesday 06/09/2022, at 11:00 - 12:30** *"Modelling and simulation, structural optimization"*

Chairmen: Assoc. Prof. Jan **Krmela**, Prof. Marek **Macko**

1. Zbigniew **Saternus**, Tomasz **Domański**, Marcin **Kubiak**, Wiesława **Piekarska**
   *The influence of welding stresses on the numerical estimation of compression strength of socket welded pipes*
2. Zbigniew **Saternus**, Tomasz **Domański**, Marcin **Kubiak**, Wiesława **Piekarska**
   *Numerical modelling of temperature field and cooling rates in the heat affected zone of laser cut plate made of S235JR steel*
3. Krzysztof **Tyszczuk**, Grzegorz **Domek**, Grzegorz **Śmigielski**
   *Research and modeling of operational damage to bearings in a shredder of biological materials*
4. Jakub **Lewandowski**, Jacek **Jackiewicz**
   *Structural design optimization of knee replacement implants based on preoperative computed tomography scan*
5. Marcin **Kubiak**, Zbigniew **Saternus**, Tomasz **Domański**, Wiesława **Piekarska**, Sebastian **Stano**, Stanisław **Kucharski**
   *Numerical modelling of thermal and structural phenomena in a lap joint of different materials welded by a laser beam*
6. Jarosław **Markowski**, Pawel **Imiłkowski**, Piotr **Długiewicz**, Paweł **Benedict**, Jacek **Mądry**, Grzegorz **Wieczorkiewicz**
   *Model analysis of the oil film in a cylindrical roller bearing in terms of the assessment of thermodynamic parameters of oil*

**Session C3: Tuesday 06/09/2022, at 11:00 - 12:30** *"Methods and systems in machine design" & "Modelling of structural materials, composite and nanomaterials"*

Chairmen: Prof. Tomasz **Domański**, Assoc. Prof. Milan **Vaško**

1. Ireneusz **Dziubek**, Adam **Hofman**
   *Operational safety of black powder firearms on the example of the Remington 1858 New Army .44 revolver*
2. Radosław **Pytliński**, Karol **Konecki**, Andrzej **Kołodziej**
   *Equation of identity for two spur gears with straight teeth having two different alternative sets of geometric parameters*
3. Julian **Rech**, Bernhard **Möginger**, Berenika **Hausnerova**
   *Quantitative determination of adhesion factors by modelling Young's moduli of glass bead reinforced thermoplastics*
4. Nitin **Satpute**, Kaustubh **Utpat**, Atharva **Joshi**, Nishant **Kulkarni**, Siddharth **Jabade**, Marek **Iwaniec**, Ramesh **Narina**, Ludwin **Molina Arias**
   *Investigation for application of egg shell micro powder based epoxy composite for vibration isolation of MEMS sensor*
5. Mariia **Kumeda**, Liudmyla **Sukhodub**, Leonid **Sukhodub**, Jan **Krmela**, Vladimíra **Krmelová**
   *Influence Chemical Parameters and Composition on Dependence of Nerve Conduits Structure*

**Session D1: Tuesday 06/09/2022, at 14:30 - 16:00** *"Experimental mechanics, identification and validation"*

Chairmen: Prof. Bernhard **Möginger**, Prof. Robert **Zalewski**

1. Aleksandra **Biszczanik**, Dominik **Wojtkowiak**, Krzysztof **Wałęsa**, Jan **Górecki**
   *Influence of the geometric parameters of convergent extrusion channel of die on the maximum value of compaction stress of dry ice and on the quality of the obtained pellets*
2. Jan **Górecki**, Aleksandra **Biszczanik**, Krzysztof **Wałęsa**, Dominik **Wojtkowiak**
   *Test Stand and a Preliminary Research on the Efficiency of the Dry Ice Production with a Crank and Piston Pelletizer*
3. Silvia **Slabejová**, Michal **Šajgalík**, Peter **Kozový**, Jozef **Holubják**, Richard **Joch**, Mário **Drbúl**
   *Simulation of the effect of cutting forces on surface integrity after machining with monolithic ceramic cutter*
4. Pavol **Timko**
   *GPS product specification as a tool for threaded holes positioning*

5. Aleksandra **Biszczanik**, Krzysztof **Talaśka**, Dominik **Wilczyński**
   *Evaluation of the effect of toothed belt specimen preparation on the results of empirical static tensile testing.*

**Session D2: Tuesday 06/09/2022, at 14:30 - 16:00** *"Modelling and simulation, structural optimization"*

Chairmen: Prof. Ireneusz **Dziubek**, Assoc. Prof. Branislav **Ftorek**

1. Alžbeta **Sapietová**, Miroslav **Jantošovič**, Vladimír **Dekýš**, Milan **Sapieta**, Zdenko **Šavrnoch**
   *Analysis of parameters for the production of seat component by injection molding technology*
2. Marek **Macko**, Paweł **Cyprys**
   *Analysis of geometrical changes of the extrusion blow molding die on polymer flow parameters with the use of SolidWorks Flow Simulation application*
3. Marek **Macko**, Andrzej **Szczepańczyk**
   *Design modifications of an universal grinder to comminute polymeric materials based on CAE simulation analyses*
4. Pavol **Šťastniak**
   *Design of a height-adjustable boarding system for a new double-deck railway vehicle*
5. Petr **Baron**, Marek **Kočiško**, Simona **Hlavatá**
   *Verification of term fulfillment of production orders with computer simulation tools*

**Session D3: Tuesday 06/09/2022, at 14:30 - 16:00** *"Physical and chemical properties of materials"*

Chairmen: PhD Eng. Ján **Dižo**, Prof. Piotr **Krawiec**

1. Daniel **Kaczor**, Krzysztof **Bajer**, Grzegorz **Domek**, Piotr **Madajski**, Aneta **Raszkowska-Kaczor**, Paweł **Szroeder**
   *Influence of extruder plasticizing systems on the selected properties of PLA/graphite composite*
2. Michał **Bembenek**, Andrzej **Uhryński**
   *The use of thermography to determine the compaction of a saddle-shaped briquette produced in an innovative roller press compaction unit*
3. Mariana **Pajtášová**, Zuzana **Mičicová**, Slavomíra **Božeková**, Darina **Ondrušová**
   *Effects of a silane coupling agent on viscoelastic properties of bentonite-filled rubber blend*

4. Darina **Ondrušová**, Slavomíra **Božeková**, Ivan **Labaj**, Mariana **Pajtášová**, Zuzana **Mičicová**

   *The influence of wood flour based plasticizer on the rheological and mechanical properties of elastomers*

5. Róbert **Janík**, Marcel **Kohutiar**, Lenka **Bartošová**, Petra **Skalková**, Mariana **Pajtášová**

   *Dynamic-mechanical analysis of 3D printed PLA material after its surface modification*

6. Silvia **Ďurišová**, Mariana **Pajtášová**, Róbert **Janík**, Darina **Ondrušová**, Ivan **Labaj**, Slavomíra **Božeková**, Andrej **Dubec**, Simona **Brigantová**

   *Diffuse coplanar surface barrier discharge assisted surface modification of un-vulcanized skim rubber blend*


**Session E1: Wednesday 07/09/2022, at 17:30 - 18:30** *"Experimental mechanics, identification and validation"*

Chairmen: Prof. Dorota **Czarnecka-Komorowska**, PhD Eng. Marián **Handrik**

1. Peter **Kozový**, Michal **Šajgalík**, Jozef **Holubják**, Silvia **Slabejová**, Richard **Joch**, Mário **Drbúl**

   *Influence of the microgeometry of milling cutter on generation of residual stress in superficial layers of material after trochoidal milling*

2. Miroslav **Cedzo**, Andrej **Czán**, Jozef **Holubják**, Richard **Joch**, Mário **Drbúl**, Vladimír **Bechný**

   *Verification of the use of a monolithic rotary tool for turning with actively driven rotation in machining of hardened steel*

3. Sonali **Powar**, Pooja **Kulkarni**, Nitin **Satpute**, Siddhrath **Jabade**, Ramesh **Narina**, Marek **Iwaniec**, Urszula **Kania**

   *Image processing based method for measurement of oil contamination in water*

4. Sonali **Powar**, Pooja **Kulkarni**, Nitin **Satpute**, Siddhrath **Jabade**, Ramesh **Narina**, Marek **Iwaniec**, Urszula **Kania**

   *MEMS camera image processing for oil contamination detection*

**Session E2: Wednesday 07/09/2022, at 17:30 - 18:30** *"Modelling and simulation, structural optimization"*

Chairmen: PhD Eng. Maciej **Bodnicki**, Prof. Martin **Hagara**

1. Jarosław **Seńko**, Radosław **Nowak**, Karol **Sztwiertnia**, Tomasz **Wróbel**, Marek **Szudrowicz**
   *Methodology of developing a modular mine blast protected vehicle seat*
2. Václav **Marek**
   *Study on cooling of high performance SiC features*
3. Przemysław **Moczko**
   *Challenges in the design of new centrifugal fan with variable impeller geometry*
4. Karol **Konecki**, Andrzej **Kołodziej**, Dominik **Wojtkowiak**, Krzysztof **Talaśka**
   *Simulation of different geometric variants of spur gears in the context of their complete identity*

**Session E3: Wednesday 07/09/2022, at 17:30 - 18:30** *"Machine dynamics and multibody systems simulations"*

Chairmen: Prof. Michał **Bembenek**, PhD Eng. Lenka **Jakubovičová**

1. Ján **Dižo**, Miroslav **Blatnický**, Paweł **Droździel**, Rafał **Melnik**, Jacek **Caban**, Adam **Kafrik**
   *Investigation of driving stability of a vehicle-trailer combination depending on a position of the load on a trailer*
2. Jacek **Jackiewicz**
   *A flywheel-based regenerative braking system for railway vehicles*
3. Grzegorz **Ślaski**, Zbyszko **Klockiewicz**
   *Comparison of vehicle suspension dynamic responses for simplified and advanced adjustable damper models with friction, hysteresis and actuation delay for different comfort-oriented control strategies*
4. Grzegorz **Ślaski**, Zbyszko **Klockiewicz**
   *The influence of including asymmetry, friction and hysteresis in a passive damper model on a vehicle passive suspension transmissibility functions*
5. Ján **Vavro**, Ján **Vavro** jr., Ľuboš **Marček**, Miloš **Taraba**, Lukáš **Klimek**, Pavol **Čerňava**, Jana **Kuricová**
   *Kinematic and dynamic analysis and distribution of stress for fie-item mechanism Track*

**Session F1: Thursday 08/09/2022, at 9:00 - 10:30** *"Experimental mechanics, identification and validation"*

Chairmen: Assoc. Prof. Silvia **Maláková**, Assoc. Prof. Grzegorz **Ślaski**

1. Jarosław **Adamiec**, Philipp **Masch**, Daniela **Schob**, Holger **Sparr**, Ilja **Sagradov**, Maciej **Obst**, Matthias **Ziegenhorn**
   *Testing machine for precision material testing with stepper motor and force sensor*
2. Konrad J. **Waluś**, Zbigniew **Olszewski**, Piotr **Krawiec**
   *Experimental tests of the tension of cargo securing belts in road transport*
3. Maciej **Berdychowski**, Jan **Gąsior**
   *Examination of the Destruction Process of Fabrics*
4. Mateusz **Kukla**, Daniel **Mikołajczyk**
   *Rolling resistance measurements with the minimization of inertia influence*
5. Dominik **Rybarczyk**
   *Design of the control system of the test stand for wheelchair testing*

**Session F2: Thursday 08/09/2022, at 9:00 - 10:30** *"Modelling and simulation, structural optimization" & "Machine dynamics and multibody systems simulations"*

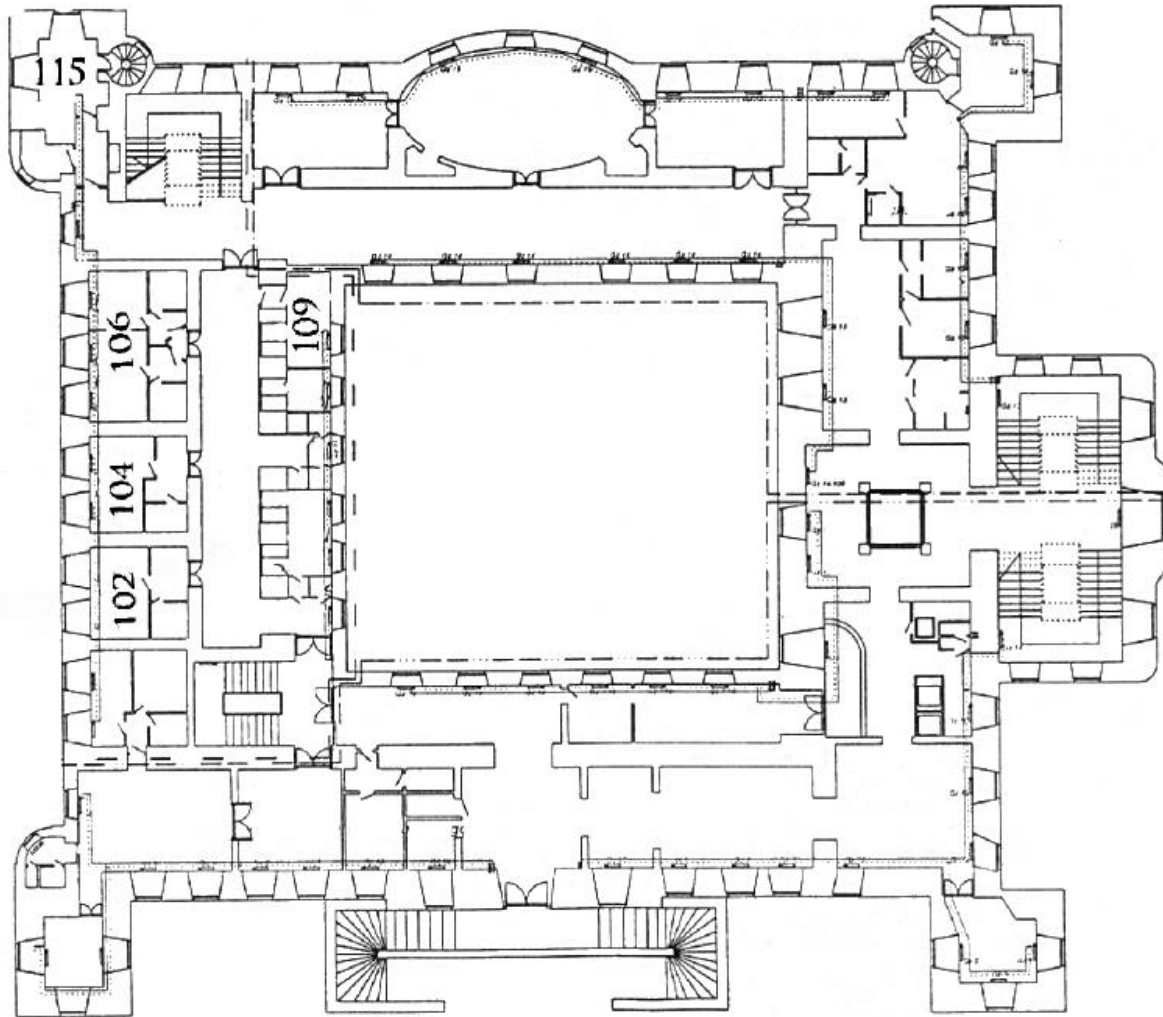Chairmen: PhD Eng. Jan **Górecki**, RNDr. PhD Mária **Michalková**

1. Mikołaj **Spadło**, Grzegorz **Ślaski**
   *Design of nonlinear leaf spring stiffness characteristics for L7e commercial vehicle with use of nonlinear FEM analysis and its experimental testing*
2. Pavol **Šťastniak**
   *Design of a height-adjustable boarding system for a new double-deck railway vehicle*
3. Ireneusz **Dziubek**, Adam **Hofman**
   *Procedural virtual reality simulators in the safety certification process*
4. Bartosz **Wieczorek**, Łukasz **Warguła**, Mateusz **Kukla**
   *Influence of a hybrid manual-electric wheelchair drive system on the user's muscular effort*
5. Michal **Šašala**, Jozef **Svetlík**, Štefan **Ondočko**, Tomáš **Stejskal**
   *Research of reducing the number of manufactured parts for Universal Rotation Module*

**Session F3: Thursday 08/09/2022, at 9:00 - 10:30** *"Physical and chemical properties of materials"*

Chairmen: PhD Zuzana **Sedliačková**, PhD Eng. Dominik **Wilczyński**
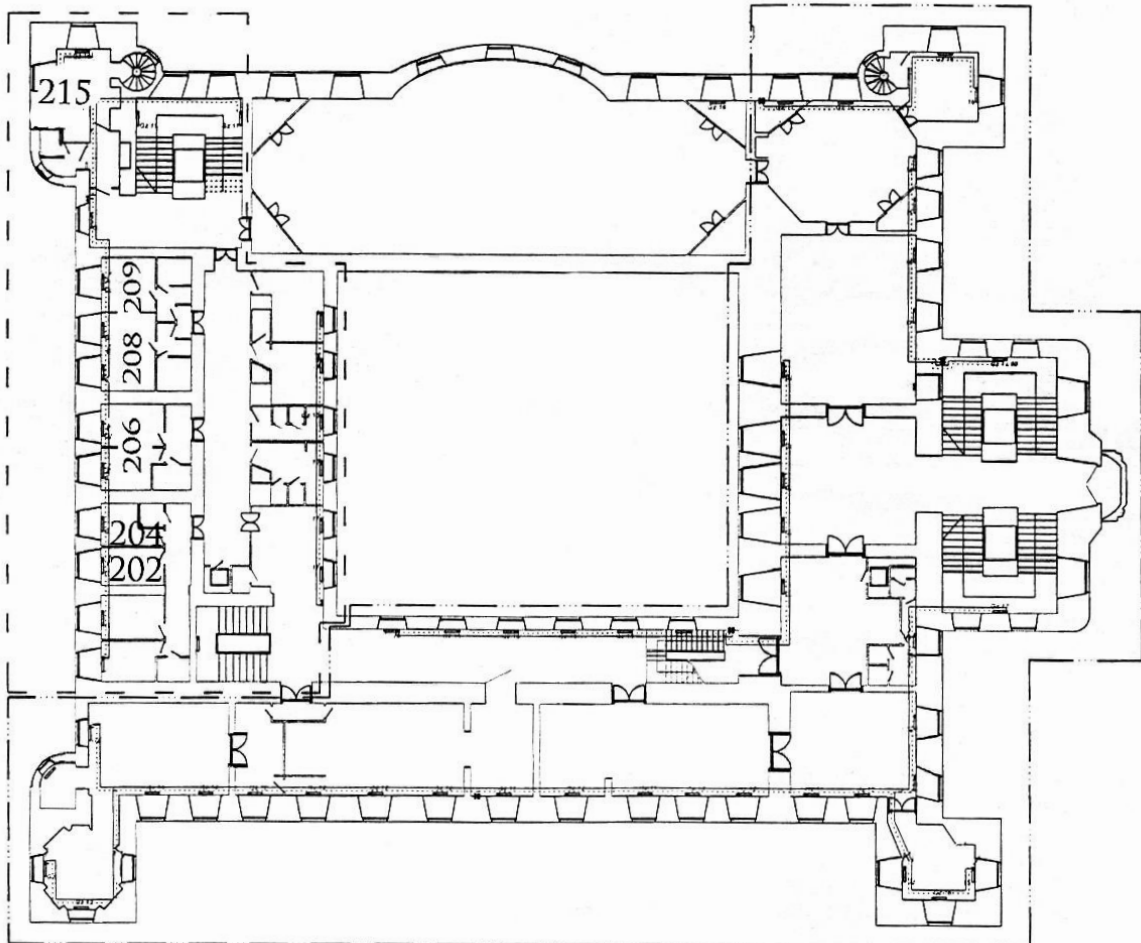
1. Marian **Dudziak**
   *Comments on the assessment of modelling uncertainty in machine building*
2. Simona **Brigantová**, Mariana **Pajtášová**, Darina **Ondrušová**, Ivan **Labaj**, Zuzana **Mičicová**, Slavomíra **Božeková**, Silvia **Ďurišová**
   *Liquid rubber in the rubber industry and its effect on selected properties*
3. Ivan **Labaj**, Darina **Ondrušová**, Petra **Skalková**, Juliána **Vršková**, Mariana **Pajtášová**, Jana **Dobrovská**
   *The effect of alternative filler content on mixing and vulcanization process of elastomeric blends*
4. Petra **Skalková**, Ivan **Labaj**, Slavomíra **Božeková**, Róbert **Janík**, Jana **Dobrovská**
   *Analysis of rheological behavior of elastomeric blends*
5. Krzysztof **Wałęsa**, Krzysztof **Talaśka**, Dominik **Wilczyński**
   *Identification of the selected thermomechanical parameters of round belts made of thermoplastic elastomer*
6. Slavomíra **Božeková**, Zuzana **Mičicová**, Petra **Skalková**, Mariana **Pajtášová**, Darina **Ondrušová**
   *Influence of alternative fillers on rheological behaviors of polymer materials*

# *1<sup>st</sup> floor*

# *2<sup>nd</sup> floor*

*27 th Polish - Slovak Scientific Conference on*
**Machine Modelling and Simulations**

# 3<sup>rd</sup> floor