XXVII Conference on Computer Methods in Materials Technology

Conference Schedule

2021.03.08-09

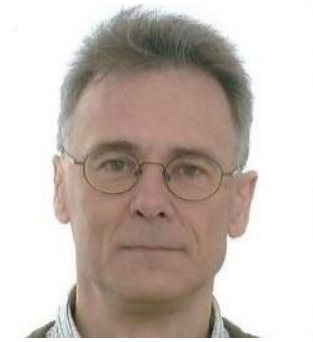
Conference will be organized as an online event – all **access links** to virtual rooms with particular sessions will be available in conference system https://kpt2021.suberus.net/ after registration

Kraków

Plenary lectures

Evolution of data science tools in a steel company

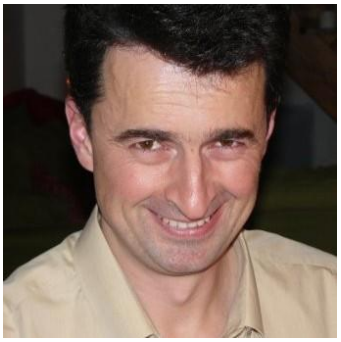
Author: **Luc Van De Putte**, ArcelorMittal Belgium cluster, Gent, Genk, Liege, Belgium



Graduated in 1988 from University of Ghent as Civil Engineer in Electro Mechanics & Control Systems. Defended master thesis entitled Expert System for road planning. He started in the Sidmar steelplant (ArcelorMittal Gent) in 1988, as engineer responsible for Computer Systems & Process Models. In this function he covered the whole steelmaking process and was responsible for everything related to IT, Industrial Automation and Models. The focus was on improving the process control, thus allowing to enhance productivity, quality and costs. In 2017 he moved to Poland, where he lead the Modelling team. With this modelling team, the scope was extended from the steelmaking process to the whole production chain from raw material to finished product. Now, he is employed in ArcelorMittal Belgium cluster in Process & IT for Primary departments (Raw Materials, Port, Transport, Cokes plant, Sinter plant, Blast furnaces) responsible for introduction of data science tools. More information can be found at: https://www.linkedin.com/in/luc-van-de-putte-01344928/

Discriminant hardening model evaluation for springback prediction

Authors: **Tudor Balan**, Yanfeng Yang, Hocine Chalal, Gabriela Vincze, Cyrille Baudouin, Arts et Metiers Institute of sTechnology, Paris, France



Dr Tudor Balan is Associate Professor at Arts et Metiers Institute of Technology, the largest French engineering school. His research work covers metal forming process simulation in general, with a focus on material modeling for both bulk and sheet metal forming, hot and cold. Dr Balan mainly contributed to the numerical treatment of constitutive models: finite element implementation of advanced models, parameter identification, optimization. For several years he worked part-time in the automotive industry as a senior expert in process simulation. His h-index is 13 with 45 papers listed on the web of science and almost 700 citations. More information can be found at https://www.linkedin.com/in/tudor-balan-b978a754/?originalSubdomain=fr

Monday, 8th of March

8:45–9:00	Conference Welcome
9:00–9:55	Plenary lecture – Luc Van De Putte
10:00–11:40	Parallel sessions
	Optimization methods (5 presentations)
	Material models and measurements (5 presentations)
11:40–12:00	Break
12:00–13:40	Parallel sessions
	Minisymposium – 1st part (5 presentations)
	Ab initio, fine scale models and nanostructures (5 presentations)
13:40–14:00	Break
14:00–14:55	Plenary lecture – Tudor Balan
15:00–16:40	Parallel sessions
	Minisymposium – 2nd part (5 presentations)
	Composites (5 presentations)
16:40–17:00	Break
17:00–18:40	Parallel sessions
	Advanced numerical models (5 presentations)
	Multiscale modelling (6 presentations)

Tuesday, 9th of March

10:00–11:40	Parallel sessions
	Numerical modelling (5 presentations)
	Modelling and identification (4 presentations)
11:40–12:00	Break
12:00–14:00	Parallel sessions
	Processes (4 presentations)
	Materials and structures (5 presentations)

Monday
8th of March

Kraków

Monday

Optimization methods

Chairman: Professor Wacław Kuś

10:00 Optimization of material distribution
for the forged automotive component
using hybrid optimization techniques
Przemysław Sebastjan, Wacław Kuś

10:20 Definition of the objective function in inverse analysis of
stochastic model of microstructure evolution in metals
Konrad Klimczak, Natalia Czyżewska, Jan Kusiak,
Paweł Morkisz, Piotr Oprocha, Maciej Pietrzyk,
Paweł Przybyłowicz, Danuta Szeliga

10:40 Guidelines for the numerical optimization of structural tests
Florian Dexl, Andreas Hauffe,
Johannes Markmiller

11:00 Artificial immune system in optimal material design
in the structure
Arkadiusz Poteralski

11:20 Artificial intelligence approach for detecting material
deterioration in hybrid building constructions
Andrei Chesnokov, Vitalii Mikhailov, Ivan Dolmatov

Monday

Material models and measurements

Chairman: Professor Krzysztof Muszka

10:00 A method for determining component-oriented toughness values with the help of a phenomenological material model
Markus Könemann, Sebastian Münstermann, Manuel Henrich

10:20 A dislocation-based constitutive model to predict strain hardening and dynamic recovery behavior of a microalloyed steel during hot deformation
Saham Sadat Sharifi, Ricardo Henrique Buzolin, Marina Gontijo , Christian Hoflehner, Maria Cecilia Poletti , Christof Sommitsch

10:40 Modeling of flow curves based on thermodynamic and data base
Grzegorz Korpala, Mathias Zapf, Ulrich Prahl

11:00 Efficient parameter fitting of the two-layer viscoplastic constitutive model
András Levente Horváth, Attila Kossa

11:20 Correlation between microstructural heterogeneity and stretch-flangeability of dual-phase and complex-phase steels
Yuling Chang, Mingxuan Lin, Junhe Lian, Christian Haase, Wolfgang Bleck

Monday

Minisymposium – 1st part

Chairman: Professor Shubhabrata Datta

12:00 Modeling and optimization of machinability of calcium treated steels
Miha Kovačič, Shpetim Salihu, Gašper Gantar, Uroš Župerl

12:20 How good are neural networks in making metallurgical PREDICTIONS?
Harry Bhadeshia

12:40 An Evolutionary Deep Neural Net Algorithm (EvoDN2) and its applications in materials research
Nirupam Chakraborti

13:00 Surrogate modelling and optimization of unit-cell based programmable metamaterials
Tobias Lichti, Heiko Andrä, Alexander Leichner, Ralf Müller, Angela Schwarz, Franziska Wenz

13:20 Genetic Algorithms in Modelling of Hot Metal Desulfurization
Tero Vuolio

Monday

Ab initio, fine scale models and nanostructures

Chairman: PhD Grzegorz Cios

12:00 Study of FeMnNiCoMo high entropy alloys based on ab-initio calculations
Kamil Cichocki, Piotr Bała, Tomasz Kozieł, Grzegorz Cios, Konrad Chrzan, Krzysztof Muszka

12:20 Simplified predicting of electron diffraction patterns elucidated with the use of 3D computer graphics
Łukasz Kokosza, Jakub Pawlak, Zbigniew Mitura

12:40 Molecular dynamics scratching of nanosized polycrystalline titanium with twin and grain boundaries
Andrey Dmitriev, Anton Nikonov, Artur Shugurov

13:00 Molecular dynamic simulations of the mechanical properties of semi-crystalline polyethylene above the glass transition temperature
Susanne Fritz

13:20 Microstructure modelling and data systems of welded hardfacings
Cong Tang, Xuejun Ren, Jing Guo, Olena Kostenevych, Xiaohu Guo, Qingxiang Yang

Monday

Minisymposium – 2nd part

Chairman: Professor Nirupam Chakraborti

15:00 A local optimized regression for data analysis
Chady Ghnatios, Ilige Hage, Re-Mi Hage

15:20 A physics-informed neural network approach to stochastic homogenization of polycrystalline materials
José Pablo Quesada Molina, Stefano Mariani

15:40 Autoregressive models for accelerated atomistic Monte Carlo simulations
Rafael Gomez-Bombarelli

16:00 Empirical and machine learning approaches to designing functional materials
Cristian Ciobanu

16:20 Metamodel-based Design Optimization of Composite Properties for Implant Applications
Shubhabrata Datta

Monday

Composites

Chairman: Professor Jerzy Rojek

15:00 Determination of sintering and residual stresses in particle reinforced composites using the discrete element method
Jerzy Rojek, Szymon Nosewicz, Marcin Chmielewski

15:20 Modelling and failure analysis of thick-walled multi-layered composite pipes under torsion loading
Tianyu Wang, Oleksandr Menshykov, Marina Menshykova, Igor Guz

15:40 Resin flow simulation in the production of composite by RTM method
Paweł Paździor, Mirosław Szczepanik

16:00 Numerical analysis of mechanical behavior in composite material of Magnesium-Carbon Nanotubes (Mg-CNTs)
Esteban Vallejo Morales, Gustavo Suárez Guerrero, Mateo Duarte García, Andrés David López Llanes , Luis Fernando Portillo Pérez, Miguel José Álvarez Meza , Juliana Andrea Niño Navia

16:20 Computational analysis of the mechanical behavior of a road protection helmet designed through nanocomposite materials
Gustavo Suárez Guerrero, Mateo Echeverri Peláez, Luis Javier Cruz Riaño, Herbert Kerguelen Grajales, Esteban Vallejo Morales

Monday

Advanced numerical models

Chairman: Professor Maciej Paszyński

17:00 Tributary areas computation for complex 3D structures
Maciej Paszynski, Victor Calo

17:20 FFT-based simulation using a reduced set of frequencies adapted to the underlying microstructure
Christian Gierden, Johanna Waimann, Bob Svendsen, Stefanie Reese

17:40 Patch Reduced Order Mechanical Model
Agathe Reille, Fatima Daim, Francisco Chinesta

18:00 Real-time tracking of crack propagation in active structures
Afsal Pulikkathodi, Elisabeth Lacazedieu, Ludovic Chamoin

18:20 Real-time simulation of additively manufactured metal part
Chady Ghnatios, Jean-Louis Duval, Francisco Chinesta

18:40 Fully and loosely coupled multiscale numerical methods in simulation of TRIP steels in modern industry
Lukasz Rauch, Krzysztof Bzowski, Mariusz Skóra

Monday

Multiscale modelling

Chairman: PhD Konrad Perzyński

17:00 Investigation of the evolution and kinetics of temperature-driven intermetallic compound during solid-state joining of an Al-Mg alloy via the multiphase-field method
Syed Hasan Raza, Benjamin Klusemann

17:20 Application of FEM and microtomography of the surface to the analysis of wheel-rail contact
Antoni John, Henryk Bąkowski

17:40 Interface cracks under harmonic shear: effects of cracks' closure and friction
Oleksandr Menshykov, Vasyl Menshykov

18:00 Model predicting phase composition in steel strips after hot rolling and cooling for stochastic input
Ivan Milenin, Łukasz Rauch, Danuta Szeliga, Maciej Pietrzyk

18:20 GPU-based hybrid numerical model (FE/MC) of grain growth in steel samples subjected to heating-remelting-cooling process
Tomasz Dębiński, Marcin Hojny, Trang Nguyen Thi Thu, Dominik Cedzidło

18:40 Effect of accumulative angular drawing on deformation inhomogenity in alpha titanium
Maciej Szymula, Paulina Lisiecka-Graca, Marcin Kwiecień, Remigiusz Błoniarz, Łukasz Madej, Krzysztof Muszka

Tuesday
9th of March

Kraków

Tuesday

Numerical modelling

Chairman: PhD Grzegorz Korpała

10:00 Numerical investigation of the explosive welding of 3-layered material
Mateusz Mojżeszko, Henryk Paul, Magdalena Miszczyk, Łukasz Madej

10:20 Numerical modeling of casted polymers reinforced with metal AM lattice structures for energy absorption applications
Giorgio De Pasquale, Luca Savigliano

10:40 Finite element analysis of the plastic injection molding of a car rear bumper to minimize the weld lines
Rogério Moreira

11:00 A numerical simulation study of mold filling in the injection molding process
Markus Baum, Denis Anders

11:20 Integrated studies of the structure and properties of multicomponent carbides
Jing Guo, Cong Tang, Olena Kostenevych, Li Wang, Xiaohu Guo, Qingxiang Yang, James Ren

Tuesday

Modelling and identification

Chairman: Professor Bartłomiej Wierzba

10:00 The modelling of the cyclic carburization process in Pyrower53 steel
Bartek Wierzba, Kamil Dychton

10:20 Analysis of the oxidized layer growth on A283C steel
Aleksandra Przyłucka, Marcin Rywotycki, Joanna Augustyn-Nadzieja, Agnieszka Cebo-Rudnicka, Zbigniew Malinowski

10:40 Identification of the heat transfer coefficient during water jet cooling of the Inconel alloy from temperatures of 500°C, 700°C and 900°C
Elżbieta Jasiewicz, Kamil Jasiewicz, Beata Hadała, Zbigniew Malinowski

11:00 Earing prediction of anisotropic sheet metals based on non-associated flow
Sara Mirandam Dipak G. Wagre, Rui L. Amaral, Abel D. Santos, Jose César de Sá

11:20 Computer system for quality assurance of welded profile production based on Big Data approach
Krzysztof Bzowski, Łukasz Rauch

Tuesday

Processes

Chairman: PhD Dominik Brands

12:00 Effect of friction on forging load during the forging with torsion: numerical simulation
Pavel Petrov, Alexey Matveev, Boris Saprykin, Mikhail Petrov, Igor Burlakov, Uday Shanker Dixit

12:20 A non-intrusive model reduction method in hot rolling
Juan Jose Sandoval Sotelo, Davide Baroli, Christian Idzik, Karen Paula Veroy-Grepl, Federico Piscaglia, Alexander Krämer, Johannes Lohmar, Gerhard Hirt

12:40 On the investigation of targeted cooling of hot bulk formed parts and the resulting residual stresses
Sonja Uebing, Christoph Kock, Dominik Brands, Lisa Scheunemann, Hendrik Wester, Bernd-Arno Behrens, Jörg Schröder

13:00 Media-based forming with press hardening of 22MnB5 tubes preformed by upset bulging
Artem Alimov, Alexander Sviridov, Rico Haase, Verena Kräusel

13:20 Computer aided design and optimization of the production of pressed products from nickel superalloys
Monika Hyrcza-Michalska

13:40 The effect of cooling conditions in the Stelmor conveyor on the formability CHQ steel
Michał Piwowarczyk, Natalia Wolańska

Tuesday

Materials and structures

Chairman: Professor Mohamed Abdelsabour Fahmy

12:00 A new BEM for modeling and simulation of 3T MDD laser generated ultrasound stress waves in FGA smart materials
Mohamed Abdelsabour Fahmy

12:20 Nonlinear optical properties of Li and P doped g-C3N4
Deepak Gorai, Tarun Kundu

12:40 Influence of material aging on structural behavior of flexible roof with polymer membrane shell
Andrei Chesnokov, Vitalii Mikhailov, Ivan Dolmatov

13:00 Structural and thermal analysis of a metal structure using the AnsysSoftware
Emanuel Mota

13:20 Finite element simulation of photothermal properties of nano-shell gold particles
Qianqian Zhang, Bin Chen, Dong Li