



COMPUTATIONAL METHODS IN MULTI-SCALE, MULTI- UNCERTAINTY AND MULTI- PHYSICS PROBLEMS

Porto | 15 -16 - 17 July

@Fundação Dr. António Cupertino de
Miranda

Avenida da Boavista, 4245
Porto



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About

The development of multi-scale, multi-uncertainty and multi-physics models has received significant attention over the last two decades. New mathematical formulations and numerical solution strategies allied to the increase in computational power/cost ratio have fostered a dramatic growth in this rapidly expanding field. Research activity in this area has been devoted to the development and combination of different analytic tools (homogenization, asymptotic analysis) and computational methods (parallel computing, stochastic analysis, code coupling) for application in fields as diverse as metal processing, composite material, oil & gas development, fuel cell technology and biomedical tissue engineering, etc. Such developments have played a central role in the understanding of the interaction among multi-physics and multi-uncertainty phenomena taking place at multiple scales in space and time.

In the most general format, the ECCOMAS Thematic Conference CM4P targets the latest advances in the modelling of in multi-scale, multi-uncertainty and multi-physics problems, and welcomes the following (not exhaustive) research topics:

- Computational homogenization and multi-scale modelling
- Stochastic modelling, probabilistic engineering, reliability and risk assessment
- Computer simulation of multi-physics processes/systems



WIFI NETWORK NAME: CCONGRESSOS

PROGRAM

July 15th	
08:30- 09:20	Registration
09:20 - 09:30	Welcome Remarks
09:30 - 10:20	<p style="text-align: center;"><u>Plenary Session 1</u></p> <p style="text-align: center;">CHARACTERIZATION OF MAGNETO-ELECTRIC COMPOSITES: AN ALGORITHMIC SCALE-BRIDGING SCHEME</p> <p style="text-align: center;">Jörg Schröder Institute of Mechanics, Civil engineering – Duisberg – Essen University Germany</p>
10:20 - 10:40	Coffee-Break
Session Chairs:	<p>@Auditorium:</p> <p>@Room A:</p> <p>@Room B:</p>
10:40 – 11:00	<p><u>Presentation 1.1 Paper 5</u> Irina Tezaur: The Schwarz Alternating Method for Multiscale Coupling in Solid Mechanics_Sandia National Laboratories_ @Auditorium</p> <p><u>Presentation 1.2 Paper 18</u> Michele Serpilli: On modeling interfaces in composite with multi-physic coupling_Università Politecnica delle Marche_ @Room A</p> <p><u>Presentation 1.3 Paper 43</u> Bert Mortier: Diffusion-Kinetic Monte Carlo Methods for Neutral Transport in Plasma Edge Simulations of Nuclear Fusion Reactors_ KU Leuven_ @Room B</p>
11:00 - 11:20	<p><u>Presentation 1.4 Paper 41</u> Wan-Chun Chuang: Simulation Model for Single unit Warpage of Shadow moire in Flip-Chip Process_National Sun Yat-sen Universit_ @Auditorium</p> <p><u>Presentation 1.5 Paper 37</u> Marco Delucia: Development of a modified Voronoi's tessellation algorithm for the determination of the effective properties of cork-based composites_Laboratoire I2M, Arts et Métiers ParisTech_ @Room A</p> <p><u>Presentation 1.6 Paper 44</u> Dmytro Pivovarov: Development of a simple ergodic stochastic representative volume element for heterogeneous materials with random geometry of microstructure_LTM, FAU Erlangen-Nuremberg_ Room B</p>

11:20 - 11:40	<p><u>Presentation 1.7</u> Paper 25_Emanuela Bosco: A computational multi-physics model to predict the chemo-mechanical degradation of historical oil paintings_Eindhoven University of Technology @Auditorium</p> <p><u>Presentation 1.8</u> Paper 250_Pawel Holobut: Assessment of the Size of the Representative Volume Element of Random Heterogeneous Materials_Institute of Fundamental Technological Research, Polish Academy of Sciences @Room A</p> <p><u>Presentation 1.9</u> Paper 231_Anna Matveeva: Virtual material characteriazation across scales and physics: case studies_Siemens Industry Software NV Room B</p>
11:40 - 12:00	<p><u>Presentation 1.10</u> Paper 230_Szymon Nosewicz: Multiscale prediction of powder properties during pressure-assisted sintering_Institute of Fundamental Technological Research Polish Academy of Sciences @Auditorium</p> <p><u>Presentation 1.11</u> Paper 221_Avraham Seifert_ On the universality of the Strouhal law for High Reynolds number bluff bodies with flow control_Tel Aviv University @Room A</p> <p><u>Presentation 1.13</u> Paper 31_Lori Graham-Brady_ Fragment size characterization for granular flow in highly damaged ceramics_ Johns Hopkins University @Room B</p>
12:00 - 12:20	<p><u>Presentation 1.14</u> Paper 201_Younes Ya Aoues_ System time-variant reliability-based structural design optimization of deteriorated truss bridges_Normandie Université, INSA Rouen France @Auditorium</p> <p><u>Presentation 1.15</u> Paper 20_Katharina Kremer_ Sub-Modeling Approach to Investigate the Cracking Behavior of Reinforced Concrete Structures Considering Polymorphic Uncertainty_Ruhr-Universitaet Bochum @Room A</p> <p><u>Presentation 1.16</u> Paper 28_Martin Doskar_ Reduced-order Modelling Scheme for Problems with Fully Resolved Microstructures Generated by Generalized Periodic Unit Cells_Czech Technical University in Prague @Room B</p>
12:20 - 13:30	Lunch Break
Afternoon	

13:30 - 14:20	<p style="text-align: center;"><u>Plenary Session 2</u></p> <p style="text-align: center;">BRIDGING THE GAP: A JOINT AUSTRO-CHINESE RESEARCH PROJECT ON MULTISCALE MODELING – STRUCTURAL ANALYSIS – EXPERIMENTS</p> <p style="text-align: center;">Prof. Herbert Mang Institute for Mechanics of Materials and Structures, TU Wien Austria</p>
Session Chairs:	<p>@Auditorium:</p> <p>@Room A:</p> <p>@Room B:</p>
14:40 – 15:00	<p><u>Presentation 1.17 Paper 246</u>_ Bahram Haddadi Sisakht_ Increased Modelling Demands by Moving from Resolved to Unresolved Simulation of Heterogeneous Reactive Systems_ TU Wien – ICEBE <u>@Auditorium</u></p> <p><u>Presentation 1.18 Paper 234</u>_ Mijo Nikolic_ Modelling of shear bands in fluid saturated poroplastic solids with embedded strong discontinuities_ University of Split, Faculty of Civil Engineering, Architecture and Geodesy_Croatia <u>@Room A</u></p> <p><u>Presentation 1.19 Paper 42</u>_ Christian Gierden_ Efficient and accurate two-scale FE-FFT-based prediction of polycrystalline material behavior at finite strains_ RWTH Aachen University <u>@Room B</u></p>
15:00 - 15:20	<p><u>Presentation 1.20 Paper 220</u>_ Pedro Prates_ Machine Learning-based Approach for Predicting Defects under Uncertainty in Sheet Metal Forming Processes_ University of Coimbra <u>@Auditorium</u></p> <p><u>Presentation 1.21 Paper 242</u>_ Caetano Miranda_ Nanoscience applied to oil and gas technologies: a multiscale computational approach_ Universidade de Sao Paulo <u>@Room A</u></p> <p><u>Presentation 1.22 Paper 226</u>_ Xiangling Gao_ Multi-scale Numerical Simulation of Reinforced Concrete Framed Structure_ Tongji University <u>@Room B</u></p>

15:20 - 15:40	<p><u>Presentation 1.23 Paper 218</u> Mohsen Ayoobi_ Data-Drive Approaches in Predicting Premixed Reactive Flow Wayne State University_ USA_ @Auditorium</p> <p><u>Presentation 1.24 Paper 241</u>_ Christian Jordan_ New Method for Numerical Calibration of a Rotary Kiln Model - A Multiscale Approach _ TU Wien/Institute of Chemical Engineering_ @Room A</p> <p><u>Presentation 1.25 Paper 213</u>_ Lu Hai_ A phase-field damage model with micro inertial effect for dynamic failure of quasi-brittle materials_ Tongji University_ @Room B</p>
15:40 – 16:00	Coffee Break
16:00- 16:20	<p><u>Presentation 1.26 Paper 265</u>_ Mohamadreza Afrasiabi_ A Thermo-Mechanically Coupled Cutting Simulation of Ti-6Al-4V Using Advanced Meshless Methods_ ETH Zurich_ @Auditorium</p> <p><u>Presentation 1.27 Paper 223</u>_ Shuai Guo_ Robust Flame Frequency Response Identification via a Multi-Fidelity Approach_ Technical University Munich_ @Room A</p> <p><u>Presentation 1.28 Paper 27</u>_ Linda J. Bolay_ Degradation of Lithium-Ion Batteries in Aerospace_ German Aerospace Cente_ @Room B</p>
16:20 - 16:40	<p><u>Presentation 1.29 Paper 235</u>_ Ruofan Gao_ Comparison of Two New Methods for Fatigue Reliability Analysis_ Tongji University_ China_ @Auditorium</p> <p><u>Presentation 1.30 Paper 26</u>_ Emanuela Bosco_ A coupled chemo-mechanical model for biogenic sulfide corrosion in concrete sewer pipes_ Eindhoven University of Technology_ Netherlands_ @Room A</p> <p><u>Presentation 1.31 Paper 8</u>_ Christoph Pohl_ Pore Water State in Heated Concrete - Comparing a Numerical Model to NMR Measurements_ Bundesanstalt für Materialforschung und – prüfung Germany_ @Room B</p>
17:00	Departure from the Conference’s venue
17:30	Welcome Session: Visit to Port Wine Cellars followed by Port Wine Tasting

July 16th	
09:00 - 09:50	<p style="text-align: center;"><u>Plenary Session 3</u></p> <p style="text-align: center;">HYBRID TWINS: ADAPTING TO MULTI-UNCERTAIN EVOLVING ENVIRONMENTS</p> <p style="text-align: center;">Prof.Francisco Chinesta ENSAM ParisTech France</p>
09:50 - 10:40	<p style="text-align: center;"><u>Plenary Session 4</u></p> <p style="text-align: center;">COMPUTATION-BASED DESIGN POLYMER COMPOSITE FOR SHOCK WAVE ENERGY ATTENUATION</p> <p>Zhuo Zhuang School of Aerospace Engineering, Tsinghua University, Beijing China</p>
10:40 - 11:00	Coffee Break
Session Chairs:	<p>@Auditorium:</p> <p>@Room A:</p> <p>@Room B:</p>
11:00 - 11:20	<p><u>Presentation 2.1 Paper 244</u>_De-Cheng Feng_Stochastic Finite Element Analysis of U-Shaped RC Shear Wall with a Novel Random Field Modeling Strategy for Open Thin-Walled Structural Members_ Southeast University China_<u>@Auditorium</u></p> <p><u>Presentation 2.2 Paper 264</u>_ Lorraine Aparecida Silva_Simulation of adhesive squeeze flow using smoothed particle hydrodynamics_Institut Clément Ader France_<u>@Room A</u></p> <p><u>Presentation 2.3 Paper 256</u>_Bernardo Proença Ferreira_A Finite-Strain Elasto-Viscoplastic Model for Rubber Toughened Glassy Polymers: Formulation and Validation_ Faculty of Engineering of the University of Porto_Portugal<u>@Room B</u></p>

11:20 - 11:40	<p><u>Presentation 2.4 Paper 237</u>_Reza Ghaffari_A Vibrational study of graphene sheets, carbon nanotubes, and nanocones_Aachen Institute for Advanced Study in Computational Engineering Science (AICES), RWTH Aachen University Germany @Auditorium</p> <p><u>Presentation 2.5 Paper 248</u>_Prem Ratan Mohan Ram_Approximation of frequency response functions with the multi-element generalised polynomial chaos method_TU Braunschwei Germany @Room A</p> <p><u>Presentation 2.6 Paper 11</u>_Witold Ogierman_Computationally efficient homogenization for modeling of nonlinear functionally graded materials_ Silesian University of Technology Poland @Room B</p>
11:40- 12:00	<p><u>Presentation 2.7 Paper 269</u>_ Florent Grotto_Multiphysical simulation of aluminum panels' behaviour hit by lightning strikes_ICA / ISAE-SUPAERO France @Auditorium</p> <p><u>Presentation 2.8 Paper 215</u>_Ye Feng Two-scale phase field modeling of damage and fracture for disordered media_Tongji University China @Room A</p> <p><u>Presentation 2.9 Paper 253</u>_Igor Lopes_A Fully Second-Order Homogenisation Model for the Analysis of Multi-Phase Materials at Finite Strains_ University of Porto_Faculty of Engineering Portugal @Room B</p>
12:00-12:20	<p><u>Presentation 2.10 Paper 266</u>_ Boussad Abbes_Multiphysics Simulation of Laser Metal Deposition Manufacturing Process Using a Meshless Method_University of Reims Champagne-Ardenne France @Auditorium</p> <p><u>Presentation 2.11 Paper 232</u>_Robin Kamenicky_Heat transfer partitioning models for nucleate boiling_University of Strathclyde United Kingdom @Room A</p> <p><u>Presentation 2.12 Paper 262</u>_Dmitry Grebennikov_Computational methods for hybrid multiscale modelling in immunology_Marchuk Institute of Numerical Mathematics of the Russian Academy of Sciences Russian Federation @Room B</p>
12:20 - 13:30	Lunch Break
AFTERNOON	

13:30 - 14:20	<p style="text-align: center;"><u>Plenary Session 5</u></p> <p style="text-align: center;">INVERSE BAYESIAN PROBLEMS AS FILTERING MAPS</p> <p style="text-align: center;">Prof. Hermann G. Matthies Institute of Scientific Computing – Technische Universität Braunschweig Germany</p>
Session Chairs:	<p>@Auditorium:</p> <p>@Room A:</p> <p>@Room B:</p>
14:20 - 14:40	<p><u>Presentation 2.13 Paper 270</u>_ Matteo Riganti _ Modelling of honeycomb composite sandwich panel with flax fiber skin_ ISAE-SUPAERO - Institut Clément Ader – France @Auditorium</p> <p><u>Presentation 2.14 Paper 261</u>_ Daniel de Bortoli _ Fully coupled multi-scale finite element analysis of TRIP-assisted multi-phase alloys_ INEGI _ Portugal @Room A</p> <p><u>Presentation 2.15 Paper 204</u>_ Chaoqun Liu _ New Vortex Identification Methods for Turbulence_ University of Texas at Arlington _ USA @Room B</p>
14:40 - 15:00	<p><u>Presentation 2.16 Paper 236</u>_ Denis Düsseldorf _ Construction of optimal basis functions in the Partition of Unity Method and their verification in complex simulations_ University of Bonn _ Germany @Auditorium</p> <p><u>Presentation 2.17 Paper 229</u>_ Matthias Birner _ A Global-Local Zooming Technique_ Fraunhofer _ Institut _ Germany @Room A</p> <p><u>Presentation 2.18 Paper 243</u>_ Zhanli Liu _ Designing phononic crystal with anticipated band structure through a deep learning based data-driven method_ Tsinghua University China @Room B</p>
15:00 - 15:20	<p><u>Presentation 2.19 Paper 233</u>_ Christine Espinosa _ A fully coupled electromagnetic-thermal-transient mechanical simulation of the load suffered by aeronautical composite panels during lightning strikes _ Institut Clément Ader France _ @Auditorium</p> <p><u>Presentation 2.20 Paper 227</u>_ António M Couto Carneiro _ Multiscale Modeling of Self-Affine Rough Contact_ INEGI Portugal @Room A</p> <p><u>Presentation 2.21 Paper 277</u>_ Ashutosh Bhokare _ Performance of drag models in CFD-DEM_ Swansea University United Kingdom @Room B</p>

15:20 - 15:40	<p><u>Presentation 2.22 Paper 268</u>_Fazilay Abbes_Computational study of deformation mechanisms in hcp metal: Application to pure zinc_University of Reims Champagne Ardenne_France_@Auditorium</p> <p><u>Presentation 2.23 Paper 263</u>_Juan Manuel Calleja Vazquez_Multiscale stochastic simulations using a MFH model constructed from full-field SVE realizations_University of Liège_Belgium_@Room A</p> <p><u>Presentation 2.24 Paper 228</u>_Fangxin Fang_Multi-scale adaptive unstructured mesh predictive modelling for environmental problems_ Imperial College_United Kingdom_@Room B</p>
15:40-16h00	Coffee Break
16:00- 16:20	<p><u>Presentation 2.25 Paper 222</u>_ Sizeng You_Quantified Relationship between Properties of Fresh Self-compacting Concrete and Workability Test Performance_Swansea University United Kingdom@Auditorium</p> <p><u>Presentation 2.26 Paper 278</u>_ Liang Yang_PyEFEM_Massively parallel python based FEM framework for flow problems_ Cranfield University_United Kingdom_@Room A</p> <p><u>Presentation 2.27 Paper 219</u>_Charles Henri Bruneau_Comparisons of direct numerical simulation and penalized models to compute the flow in a porous-fluid system_Université de Bordeaux France_@Room B</p>
16:20 - 16:40	<p><u>Presentation 2.28 Paper 12</u>_Bilen Emek Abali_Multiphysics Computation in Batteries Involving Electromagnetism and Thermomechanics_Technische Universitat_Berlin Germany@Auditorium</p> <p><u>Presentation 2.29 Paper 202</u>_Hyun Joon Chang_Examining the Mutation Effect of SLC26A4 STAS Domain By Observing the Communication Between Secondary Structures_Korea University South Korea_@Room A</p> <p><u>Presentation 2.30 Paper 273</u>_Srinivas Sriramula_Multi-scale Reliability Based Design Optimisation for Unidirectional FRP Composite Laminates_University of Aberdeen United Kingdom_@Room B</p>
16:45	DEPARTURE AND MINI BUS TOUR
19:30	ARRIVAL AT CASA DA MUSICA_CONFERENCE DINNER

July 17th	
09:00-09:50	<p style="text-align: center;"><u>Plenary Session 6:</u></p> <p style="text-align: center;">FRACTURE OF POLYMER COMPOSITE MATERIALS: SIMULATION ACROSS THE SCALES</p> <p>Prof. Pedro P. Camanho Faculty of Engineering – University of Porto</p>
09:50- 10:00	YOUNG RESEARCHERS AWARD CEREMONY
10:00 -10:50	<p style="text-align: center;"><u>Plenary Session 7</u></p> <p style="text-align: center;">MULTI-SCALE AND MULTI-PHYSICS CHALLENGES FOR FUTURE AIRCRAFT: A HIERARCHICAL APPROACH</p> <p>Paul Tucker Cambridge University United Kingdom</p>
10:50-11:10	COFFEE-BREAK
Session Chairs:	<p>@Auditorium:</p> <p>@Room A:</p> <p>@Room B:</p>
11:10 -11:30	<p><u>Presentation 3.1 Paper 47</u> Jens-Dominik Müller_ Adjoint Based Optimisation of an Internal Cooling Channel U-Bend_Queen Mary University of London United Kingdom <u>@Auditorium</u></p> <p><u>Presentation 3.2 Paper 276</u> Jinsheng Wang_ Efficient structural reliability analysis based on polynomial chaos expansion and maximum entropy method_Swansea University United Kingdom <u>@Room A</u></p> <p><u>Presentation 3.3 Paper 46</u> Thiago Doca_ Multi-uncertainty analysis of the indentation process of key engineering materials_University of Brasília – Brazil <u>@Room B</u></p>

11:30-11:50	<p><u>Presentation 3.4 Paper 267_ Shreyas Srivatsa_ Micromechanical Modeling and Estimation of Elastic Properties of Pure MXene (Ti₃C₂T_x) Films_ AGH University of Science and Technology Poland_@Auditorium</u></p> <p><u>Presentation 3.5 Paper 255_ Miguel V Carvalho_ Computational Aspects on the Constitutive Modelling of Multiphase Alloys_ Faculty of Engineering of the University of Porto_ Portugal_@Room A</u></p> <p><u>Presentation 3.6 Paper 224_ Abdelkhalak El Hami_ Numerical modelling of the uncertainties in hip prosthesis material parameters INSA Rouen France_@Room B</u></p>
11:50 -12:10	<p><u>Presentation 3.7 Paper 247_ Sule Ozturk_ A Turbulence Based Sensitivity Study on Drag Prediction of the NASA Common Research Model Aircraft_ Istanbul Technical University_ Turkey_@Auditorium</u></p> <p><u>Presentation 3.8 Paper 259_ Prattya Datta_ PGD based domain decomposition method applied to parameterized seismic models_ Technical University of Barcelona_ Spain_@Room A</u></p> <p><u>Presentation 3.9 Paper 212_ Victor Blanc_ Dynamic Analysis of a Multi-Contact Problem Using Simplified Models to Study of the Influence of Clearances on Contact Forces_ French Atomic and Alternatives Energies Commission_ France_@Room B</u></p>
12:10 -12:30	<p><u>Presentation 3.10 Paper 252_ Farzad Shirazian_ A DFT study of single layer blue phosphorus and its implementation in a continuum model_ Aachen Institute for Advanced Study in Computational Engineering Science (AICES), RWTH Aachen University Germany_@Auditorium</u></p> <p><u>Presentation 3.11 Paper 210_ Yizhi Shao_ Development of Multiscale Multi-physics Based Modelling and Simulations with the Application to Precision Machining of Aerofoil Structures_ Brunel University London United Kingdom_@Room A</u></p> <p><u>Presentation 3.12 Paper 271_ Abdelkhalak El Hami_ Probabilistic approach of a dynamic analysis of wind turbine on flexible foundation_ INSA Rouen Normandie_ France_@Room B</u></p>

12:30-12:50	<p><u>Presentation 3.13 Paper 39_ Nanda Gopala Kilingar_ Data driven computational analysis of open foam materials_ University of Liège @Auditorium</u></p> <p><u>Presentation 3.14 Paper 254_ Rui Coelho_ Ductile failure analysis in metallic materials through computational homogenization FEUP Portugal @Room A</u></p> <p><u>Presentation 3.15 Paper 238 Abdelkhalak El Hami_ Metamodels for RBDO of wire bonding in microsystem packages_ INSA Rouen Normandie_ France @Room B</u></p>
12:50 -14:30	<p>Lunch Break</p>
14:30 -14:50	<p><u>Presentation 3.16 Paper 211_Yanan Sun_ An Investigation of stepwise Crack Tip Advancement_ Swansea University_ United Kingdom @Auditorium</u></p> <p><u>Presentation 3.17 Paper 216_Jie Li_ The Refined Algrithm of Generalized Probability Density Evolution Equation Based on Reproducing Kernel Particle Method_ Tongji University Shanghai, China @Room A</u></p> <p><u>Presentation 3.18 Paper 249_ Ibrahim Cicek_ Optimization of Control Parameters for an Electrified Vertical Take-off Landing Vehicle Using the Integral Squared Method_ Istanbul Technical University_ Turkey @Room B</u></p>
14:50-15:10	<p><u>Presentation 3.19 Paper 251 Alberto Moscatello_ Scaling procedure for the design of a validation experiment on an accidental gas release _ Politecnico di Torino Italy @Auditorium</u></p> <p><u>Presentation 3.20 TO BE CONFIRMED</u></p> <p><u>Presentation 3.21 TO BE CONFIRMED</u></p>