

XVII International Conference on Computational Plasticity. Fundamentals and Applications

Technical Programme

Tuesday, 05/09/2023

Tue, 05/09/2023 07:30 - 08:15

Registration
Registration

Tue, 05/09/2023 08:15 - 08:45

Opening

Vertex Building - Auditorium

Tue, 05/09/2023 08:45 - 10:45

TUm-PL1 - - Plenary Session I

Chaired by: Prof. Djordje Peric (Swansea University)

Vertex Building - Auditorium

Application of virtual element methods for numerical simulation of inelastic response

P. Wriggers*

Towards the Multiscale Computational Design of Shock-absorbing Metamaterials: (II) From the low-scale to the upper-scale

X. Oliver*

Interaction of particulate fluids and structures. Modelling and computational challenges

E. Oñate*

Tue, 05/09/2023 10:45 - 11:30

Coffee Break

A3-A4 Building Terrace

Tue, 05/09/2023 11:30 - 13:30

TUm-101 - - IS101 - Isogeometric Analysis

Organized by: Prof. Alessandro Reali (University of Pavia), Prof. Thomas J.R. Hughes (University of Texas), Dr. Guillermo Lorenzo (University of Pavia)

Chaired by: Prof. Alessandro Reali (University of Pavia), Prof. Thomas J.R. Hughes (University of Texas at Austin), Dr. Guillermo Lorenzo (University of Pavia)

A3 - 202

Isogeometric Phase-field Description of Fracture in Complex Shell Structures **Keynote**

J. Kiendl*

Multi-Patch IGA-BEM for Helmholtz Problems using B-spline Tailored Numerical Integration

B. Degli Esposti, A. Falini, **T. Kanduc***, M. Sampoli, A. Sestini

Interacting deformable solids at low Reynolds using the Isogeometric Divergence-Conforming Immersed Boundary Method

C. Bona Casas*, J. Cerda, H. Casquero

Some Recent Advances in Isogeometric Analysis with a Focus on Structural Applications

A. Reali*

Towards the Implementation of IGA in the Automotive Industry's Crashworthiness CAE Analysis Workflows

L. Martorell*

Tue, 05/09/2023 11:30 - 13:30

TUm-203a - - IS203a - Strength and Fracture of Elastic-Plastic Materials under Extreme Conditions

Organized by: Prof. Zhuo Zhuang (Tsinghua University), Prof. Z.L. Liu (Tsinghua University), Dr. Yinan Cui (Tsinghua University)

Chaired by: Prof. Dongfeng Li (Harbin Institute of Technology, Shenzhen), Prof. Z.L. Liu (Tsinghua University)

A3 - 101

A concurrent irradiation-mechanics multiscale coupling model **Keynote**

Y. Cui*

Multiscale modeling study on the strengthening effect of coherent precipitates in IN718 superalloy

C. Wan, L. Sun, E. Busso, Z. Zhong, **D. Li***

Data-driving based reconstruction for periarthral bone defect and inference and calibration of heterogeneous and anisotropic parameterized constitution

Z. Yan, Y. Hu, Z. Liu, Y. Tian, **Z. Zhuang***

A revised Chaboche model to describe static recovery behavior of 316H stainless steel at high temperature

X. Liu*, R. Du, Y. Wei

Finite Element Implementation for Damage-Coupled Inelastic Constitutive Model for P91 Steel at High Temperature

M. Arai*, K. Okuno, D. Kashiwagi

Tue, 05/09/2023 11:30 - 13:30

A4 - 205

TUm-200b - - CT200b - Advanced Material Models and Computational Material Design

Chaired by: Prof. Steve Sun (Columbia University)

Plastic deformation based FEM solver to study lithiation in Silicon anode using phase-field modeling

U. Hussain*, N. Swaminathan, G. Phanikumar

Constitutive Modelling of Hydrolytic Degradation in Polymers

Z. Pan*, H. Chen, L. Brassart

Influence of process parameters on elasto-visco-plastic material properties in vat photopolymerization

I. Valizadeh*, O. Weeger

A Constitutive Model for the Simulation of the Behaviour of Polymer Glasses Across a Wide Range of Conditions

G. Owen*, D. De Focatiis

Viscoplastic Constitutive Model for Foam-like Materials

B. Sharma*, A. Gogulapati, A. Ramabathiran, V. Menezes

Modelling of Rate-dependent and Volumetric Inelasticity of Semi-crystalline Polymers Using an Eulerian Framework

M. Kroon*, M. Rubin

Tue, 05/09/2023 11:30 - 13:30

A3 - 103

TUm-301a - - IS301a - FFT-Based Methods For Microscale Plasticity

Organized by: Dr. Aldo Marano (ONERA), Dr. Ricardo Lebensohn (Los Alamos National Laboratory)

Chaired by: Dr. Aldo Marano (ONERA), Dr. Ricardo Lebensohn (Los Alamos National Laboratory)

Spectral-based chemo-mechanical solvers: connecting microstructure evolution to materials performance

Keynote

L. Capolungo*, D. Bamney

FFT-Based Models for Multiphysics/Multiscale Applications In Computational Plasticity

R. Lebensohn*

Gibbs Ringing Reduction for an FFT-Based Microstructure Simulation

C. Gierden*, J. Waimann, B. Svendsen, S. Reese

Efficient FFT-based mechanical solvers for abrupt interfaces

A. Finel*

Visualization of the Deep Material Network with Recursive Training

D. Shin*, R. Dingreville, R. Alberdi, R. Lebensohn

Tue, 05/09/2023 11:30 - 13:30

A4 - 206

TUm-1700c - - CT1700c - Multi-Scale Material Models and Multi-Physics Problems

Chaired by: Dr. Miguel Angel Moreno-Mateos (Institute of Applied Mechanics, FAU) and Mr. Mohamed Haddad (Université Catholique de Louvain)

Fracture-Resistant Ultra-Soft Magnetorheological Elastomers

M. Moreno-Mateos*, M. Hossain, P. Steinmann, D. Garcia-Gonzalez

Multiscale Degenerated Kinematics (MDK) Approach for the Design of Next Generation Laminated Composite Materials

P. Wierna*, D. Yago Llamas, O. Lloberas-Valls, A. Huespe, J. Oliver Olivella

Modelling of Crack Propagation in Finite Thickness Brittle Adhesive Layers

S. Sharma*, A. Ramaswamy

Viscoelastic-viscoplastic polymer composites: Development and evaluation of the two dissimilar mean field homogenization models

M. Haddad*, I. Doghri

Bayesian Inverse Analysis Application to Pyroplastic test in Ceramic Materials

J. Gómez*, D. Araya, J. García-Ten, J. Tiscar

Tue, 05/09/2023 11:30 - 13:30

A3 - 104

TUm-701a - - IS701a - Ductile Damage Under Non-Proportional Loading Conditions

Organized by: Prof. Valentina A. Salomoni (University of Padova), Dr. Riccardo Fincato (Osaka University)

Chaired by: Prof. Andrew Ruggiero (University of Cassino and Southern Lazio)

Numerical simulations of new biaxial experiments on ductile damage of thin thin sheet metal under non-proportional loading conditions

S. Gerke*, F. Ramón Valencia, M. Brünig

Numerical Analysis of Ductile Damage and Fracture Behavior of Aluminum Alloys under Biaxial Reverse Loading Experiments

Z. Wei*, S. Gerke, M. Brünig

A Surrogate Model for Strain Localisation in Finite Element Analysis of Ductile Failure

H. Næss*, D. Morin, O. Hopperstad

Machine Learning Based Localization Prediction Under Non-Proportional Loading

M. Körgesaar*, M. Yarkin

Bifurcation Theory of Plasticity, Damage and Failure

A. Umantsev*

Tue, 05/09/2023 11:30 - 13:30

A3 - 105

TUm-708 - - IS708 - Elastoplastic and Viscoplastic Models

Organized by: Prof. Koichi Hashiguchi (MSC Software, Ltd.), Dr. Motoharu Tateishi (MSC Software, Ltd.), Dr. Yuki Yamakawa (Tohoku University)

Chaired by: Prof. Hashiguchi Hashiguchi (MSC Software, Ltd.)

Development of nonlinear kinematic hardening modeling concepts for simulation of low-cycle fatigue and creep responses

Keynote

T. Hassan*, S. Quayyum, N. Islam, R. Ahmed

A subloading damage surface model for Mullins effect of rubber-like solids

J. Yoshida*, K. Hashiguchi

The Subloading Surface Concept in the Modeling of Complex Inelastic Soil Behaviour

J. Maranhã*

Assessment of elastoplastic and viscoplastic models

K. Hashiguchi*

TUm-1500 - - CT1500 - Model Reduction and Real Time Computing Techniques

Chaired by: Prof. Olivier Allix (ENS Paris-Saclay) and Prof. Riccardo Rossi (CIMNE/UPC)

Optimal assumptions for 2D predicted thermal fields during directed energy deposition

C. Gallo*, L. Duchene, A. Habraken

Optimal hyper-reduction algorithms in reduced order modelling: Continuous and Local approaches

J. Hernandez Ortega*, J. Bravo Martínez, S. de Parga Regalado, R. Rossi Bernecoli

A Petrov-Galerkin Method for Hyper-Reduced Order Modeling of Symmetric and Nonsymmetric Problems without Complementary Meshes

S. Ares de Parga Regalado, J. Bravo Martínez, J. Hernandez Ortega, R. Zorrilla Martínez, **R. Rossi Bernecoli***

On a wave-based reduced order method for transient dynamic computation including medium frequency.

O. Allix*, P. Ladevèze

Modeling creep deformation of short fiber reinforced plastics using Deep Material Networks for parameter identification and upscaling

A. Dey*, F. Welschinger, M. Schneider, S. Gajek, T. Böhlke

GNN-Assisted Phase Space Integration with Application to Atomistics

S. Saxena*, J. Bastek, M. Spinola, P. Gupta, D. Kochmann**TUm-902a - - IS902a - Physics-informed and Augmented Learning in the Mechanics of Materials**

Organized by: Prof. Francisco Chinesta (ESI GROUP Chair, ENSAM ParisTech), Prof. Elias Cueto (Universidad de Zaragoza), Prof. Benjamin Klusemann (Leuphana University of Lüneburg), Prof. Francisco J. Montáns (Universidad Politécnica de Madrid)

Chaired by: Prof. Elias Cueto (Universidad de Zaragoza), Prof. Francisco Chinesta (ESI GROUP Chair, ENSAM ParisTech)

Elasto-plasticity in Data Poor Regimes with Convex Model-Data-Driven Yield Functions **Keynote****M. Marino***, J. Fuhg, A. Fau, N. Bouklas

Constitutive Modeling of Woven Composites based on Artificial Neural Networks informed by Multi-scale Analyses

M. El Fallaki Idrissi*, F. Praud, F. Meraghni, F. Chinesta, G. Chatzigeorgiou

Data-driven Models For Shrinkage Porosity Prediction In Aluminium Casting

M. Nouri*, J. Artozoul, A. Caillaud, A. Ammar, F. Chinesta, O. Köser

Prediction of cross-sectional geometric features of SPR joints based on the punch force-displacement curve using machine learning

B. Ferrándiz*, M. Daoud, F. Chinesta**TUm-1001a - - IS1001a - Recent Advances in Constitutive Model for Soils**

Organized by: Prof. Wei Wu (University of Natural Resources and Life Sciences), Prof. Koichi Hashiguchi (MSC Software, Ltd.), Yuki Yamakawa (Tohoku University)

Chaired by: Prof. Wei Wu (University of Natural Resources and Life Sciences, Vienna), Dr. Yuki Yamakawa (Tohoku University), Prof. Hashiguchi Hashiguchi (MSC Software, Ltd.)

Micro-inspired constitutive modelling of clays based on thermodynamics

A. Amorosi*

Reconstruction of Cam-clay model based on finite deformation theory guaranteeing the existence of the state boundary surface

Y. Abe*, S. Yamada, K. Hoshi, T. Kyoya

State Parameter-Dependent Soil Constitutive Model

S. Jockovic*, N. Obradovic, M. Vukicevic

Recent Advances in Anisotropic Hypoplastic Models for Granular Soils

Z. Yang*, D. Liao

Finite element analysis of Expansive bedrock based on the Multiplicative decomposition of the Deformation gradient

K. Hoshi*, S. Yamada, Y. Abe, T. Kyoya**TUm-1402 - - IS1402 - Computational Modeling of Large Deformation Processes**

Organized by: Prof. Jean Philippe Ponthot (University of Liège), Prof. Carlos Agelet de Saracibar (CIMNE/UPC)

Chaired by: Prof. Jean Philippe Ponthot (University of Liège), Prof. Carlos Agelet de Saracibar (CIMNE/UPC)

An LBB-stable tetrahedral finite element based on a Pseudo-Random Integration (PRI) method for finite strain von Mises elasto-plasticity **Keynote****E. Feulvarch***, A. Brosse, Y. Vincent

Eulerian Modeling of Large Plastic Deformation of Crystals With Applications to Micro-pillars

J. Smiri*, O. Salman, I. Ionescu

Application of Particle Finite Element Method in Ultrasonic Vibration-Assisted Machining

H. Bakhshan*, J. Carbonell, E. Oriate

Simplified and Complete Models for Hot Forming a Complex Industrial Part

S. Rangasamy Mahendren*, O. Pantale, Y. Marcel, O. Dalverny

Efficient Virtual Process Modeling of Metallic Bipolar Plate Stamping

L. Gassler*, M. Afrasiabi, M. Bambach

Tue, 05/09/2023 11:30 - 13:30

A3 - 001

TUm-1701a - IS1701a - Non-local Models for Plasticity, Fracture and Interfacial Problems

Organized by: Dr. Emilio Martínez-Pañeda (Imperial College London), Prof. Christian Niordson (Technical University of Denmark), Prof. Benjamin Klusemann (Leuphana University of Lüneburg)
Chaired by: Prof. Christian Niordson (Technical University of Denmark)

Phase-field modeling of pitting and mechanically-assisted corrosion of Mg alloys for biomedical applications **Keynote**

S. Kovacevic, W. Ali, E. Martínez-Pañeda, J. LLorca*

Evolution of precipitates in Al alloys using Phase-field method

R. Chafle*, E. Mathew, A. Safi, B. Klusemann

A phase-field based electro-chemo-mechanical model for predicting voiding in all-solid-state batteries

E. Martínez-Pañeda*, R. Wang, Y. Zhao

An advanced multi-phase field approach for coupled electro-chemo-mechanical problems using the preCICE library applied to fcc grain microstructure

C. Kandekar*, A. Ravikumar, D. Höche, W. Weber

Towards a sharp phase-field method: a hybrid diffuse-semisharp approach for microstructure evolution problems

J. Dobrzanski*, S. Stupkiewicz

Tue, 05/09/2023 11:30 - 13:30

A3 - 002

TUm-1705a - IS1705a - Multiscale Modeling and Characterisation in Structural Materials

Organized by: Prof. Ikumu Watanabe (National Institute for Materials Science), Prof. Joao Quinta da Fonseca (University of Manchester)
Chaired by: Prof. Ikumu Watanabe (National Institute for Materials Science)

Characterization of Mechanical Properties of Alloys using Instrumented Indentation Test **Keynote**

I. Watanabe*, T. Chen, D. Liu

The Development of Grain Structure During Additive Manufacturing: a Comparison Between Experiment and Simulation

P. Voorhees, A. Chadwick, A. Birnbaum, J. Michopoulos, J. Santos Macias, M. Upadhyay*, G. Wagner

Bridging Length Scales in Texture Prediction using Multi-Fidelity Gaussian Processes

M. Atkinson*, P. Shanthraj, T. Dodwell, J. Quinta da Fonseca

Multiscale Modelling of Hydrogen Diffusion Induced Damage in Alloy

T. Tan*, I. Watanabe

Tue, 05/09/2023 11:30 - 13:30

A3 - 106

TUm-1704a - IS1704a - Scale Bridging in Material Failure : From Micro- to Macro-scale Modeling and Experimentation

Organized by: Dr. Gergely Molnár (INSA de Lyon /CNRS), Prof. Anthony Gravouil (INSA Lyon), Prof. Guillaume Kermouche (Ecole des Mines de Saint-Etienne)
Chaired by: Dr. Gergely Molnar (INSA de Lyon / CNRS)

Insights from the quantitative calibration of an elasto-plastic model from a Lennard-Jones atomic glass

D. Fernandez-Castellanos*, S. Roux, S. Patinet

Atomistic Simulations, Mesoscale Modelling and Micromechanical Testing of Crack-Microstructure Interactions

E. Bitzek*

Strong and Ductile Metallic Glass Films through Advanced Nanoarchitectural Design Strategies

F. Bignoli, A. Brognara, P. Djemia, D. Faurie, A. Li Bassi, G. Dehm, M. Ghidelli*

Scale bridging evaluation of the fracture behavior of an advanced TiAl alloy

M. Burtscher*, O. Can Sen, M. Alfreider, A. Chauniyal, R. Janisch, D. Kiener

Multi-scale modeling of damage in woven composites

A. Doitrand*

Multi-scale Failure in Architected Materials

E. Eid*, R. Seghir, J. Réthoré

Tue, 05/09/2023 13:30 - 14:30

A3-A4 Building Terrace

Lunch Break

Tue, 05/09/2023 14:30 - 16:30

Vêrtex Building - Auditorium

TUa-PL2 - Plenary Session II

Chaired by: Prof. Peter Wriggers (Leibniz University of Hannover)

Phase-field Fracture: Toward a General Purpose Technology (Preliminary title)

T. Hughes*

Fracture with Phase-Field Models: Discretization, Acceleration, Application

S. Kollmannsberger*

Additive Manufacturing: some dreams, some nightmares

F. Auricchio*

Tue, 05/09/2023 16:30 - 17:00

A3-A4 Building Terrace

Coffee Break

Tue, 05/09/2023 17:00 - 19:00

A3 - 202

TUa-300 - - CT300 - Atomistic, Nano and Micro-mechanics of Materials

Chaired by: Prof. Javier LLorca (Universidad Politécnica de Madrid)

Role of temperature and preexisting dislocation network on shock compression of copper crystals

I. Bryukhanov*

Grain microstructure evolution using orientation phase field and Cosserat crystal plasticity

I. Tandogan*, M. Budnizki, S. Sandfeld

A Data-Based Derivation of Internal Correction Stress for the Coarse-Graining in Dislocation-Based Plasticity

S. Lee*, K. Schulz

Diffusion Effect on the Cohesive Zone Model of SiC/Al Interface using Atomistic Simulations

M. Tahani*, E. Postek, T. Sadowski

Inelastic rotations in crystal plasticity

O. Salman*, A. Ahadi

Tue, 05/09/2023 17:00 - 19:00

A3 - 101

TUa-203b - - IS203b - Strength and Fracture of Elastic-Plastic Materials under Extreme Conditions

Organized by: Prof. Zhuo Zhuang (Tsinghua University), Prof. Z.L. Liu (Tsinghua University), Dr. Yinan Cui (Tsinghua University)

Chaired by: Prof. Xiaoming Liu (Chinese Academy of Sciences)

Numerical and theoretical modelling for the elastic-plastic backface deformation of ultra-high molecular weight polyethylene laminate under ballistic impact **Keynote**

S. Yang, **Z. Liu***

Incorporating Void Formation and Growth Into the Vector-Density-Based Continuum Dislocation Dynamics Approach

P. Lin*, V. Vivekanandan, A. El-Azab

Characterizing The Elasto-Plastic Anisotropic Mechanical Property Of Cancellous Bone Via a Bayesian Calibration Method

Z. Yan*, Z. Liu, Z. Zhuang

A Fracture Mechanics-Based Approach for Cylindrical Cavity Expansion in the Elastoplastic Medium

Y. Gao*, Z. Liu, Z. Zhuang, E. Detournay

Mechanical Modeling of WC-Co Composites at Microscale Using Extreme Value Statistics and Realistic FE Meshes

P. Sousa Machado*, F. Caner, E. Jimenez-Pique, L. Llanes

Tue, 05/09/2023 17:00 - 19:00

A4 - 205

TUa-200c - - CT200c - Advanced Material Models and Computational Material Design

Chaired by: Prof. Marc Geers (Eindhoven University of Technology)

Finite Strain Rate-Independent Single Crystal Plasticity Algorithm Based on Interior-Point Methods

A. Niehüser*, J. Mosler

Residual Stress Estimation of Ceramics during Sintering Process with Finite Strain and Viscoplasticity

C. Natsumeda*, K. Matsui, J. Tatami, T. Yamada

Crystal plasticity simulation of in-grain microstructure and microtexture evolution during large deformation

K. Sedighiani*, K. Traka, M. Diehl, F. Roters, J. Sietsma, D. Raabe

A study of alpha morphology on the local plasticity and texture development of alpha-beta Ti alloys

G. Bowker*, A. Plowman, J. Quinta da Fonseca, P. Shanthraj

Orientation-dependent Lath Martensite Yielding Controls the Hardening Behavior of Quenched Martensitic Steels

V. Rezaadeh*, R. H.j. Peerlings, J. P.M. Hoefnagels, F. Maresca, M. G.D. Geers

Finite-Strain Thermomechanics of Viscoelastic-Viscoplastic Model for Thermoplastic Polymers

U. Jinaga*, K. Zulueta, L. Noels

Tue, 05/09/2023 17:00 - 19:00

A3 - 103

TUa-301b - - IS301b - FFT-Based Methods For Microscale Plasticity

Organized by: Dr. Aldo Marano (ONERA), Dr. Ricardo Lebensohn (Los Alamos National Laboratory)

Chaired by: Dr. Aldo Marano (ONERA), Dr. Ricardo Lebensohn (Los Alamos National Laboratory)

A fft based method for mesoscale continuum dislocation mechanics with defect energy

S. Berbenni*, R. Lebensohn, V. Taupin

Combining Diffraction Microstructure Imaging and FFT Simulations to Study Polycrystal Plasticity

C. Ribart, A. Marano, W. Ludwig, **H. Proudhon***

Construction of a model of Field Dislocation Mechanics applied to the viscoplastic behaviour of Uranium Dioxide

É. Castelier*, H. Bouizem, V. Taupin

FFT-based Crystal Plasticity Study On Strain Localization In Irradiated Austenitic Stainless Steel

A. Lame Jouybari*, S. El Shawish, L. Cizelj

FFT-based modeling of intragranular slip localization FFT modes within polycrystals

A. Marano*, L. Gélébart, S. Forest

An FFT Based Discrete Slip Plane Approach to Simulate the Deformation of Tungsten Nanofoams

C. Ruestes*, J. Segurado

Tue, 05/09/2023 17:00 - 19:00

A4 - 206

TUa-501 - - IS501 - Advanced Modeling and Simulation in Biomechanics: from Molecules to Tissues

Organized by: Prof. Gerhard A. Holzapfel (Graz University of Technology), Prof. José Manuel García-Aznar (University of Zaragoza), Dr. Adrian Buganza Tepole (Purdue University)

Chaired by: Prof. Gerhard Holzapfel (Graz University of Technology), Prof. Jose Manuel Garcia-Aznar (University of Zaragoza)

Macro and Microscale Mechanics of Abdominal Aortic Aneurysms

M. Terzano*, M. Dalbosco, G. Holzapfel

A Novel Methodological Approach for Process Design in Extrusion-based Bioprinting

F. Chirianni*, G. Vairo, M. Marino

3D reconstruction of an orientation distribution from planar projections according to the principle of maximum entropy

M. Wollner*, A. Pukaluk, C. Holzer, G. Holzapfel

In-vitro experimental modelling and computational simulations of tumour organoid growth

J. Garcia-Aznar*

Modeling the Microstructure of Artery Walls with a Focus on Collagen Cross-Links

G. Holzapfel*

Mechanics and Mechanobiology of Cutaneous Wounds: Hypothesis Testing with a Computational Model

M. Pensalfini*, A. Buganza

Tue, 05/09/2023 17:00 - 19:00

A3 - 104

TUa-701b - - IS701b - Ductile Damage Under Non-Proportional Loading Conditions

Organized by: Prof. Valentina A. Salomoni (University of Padova), Dr. Riccardo Fincato (Osaka University)

Chaired by: Dr. Steffen Gerke (Universität der Bundeswehr München)

Ductile Fracture in Shear Sensitive Materials: Mechanisms and Modeling

N. Bonora, G. Iannitti, **A. Ruggiero***, G. Testa

Phase Field Modelling of Ductile Fracture in the Context of Continuum Damage Mechanics

A. Tsakmakis*, M. Vormwald

Micromechanical study of loading path effects on ductile failure

S. Keralavarma*, M. Chouksey

Damage Regularization Via The Eikonal Gradient Non-Local Method: Properties And Couplings With Plasticity

E. Baranger*, F. Marconi, R. Desmorat, M. Jirasek, M. Horak

Tue, 05/09/2023 17:00 - 19:00

A3 - 105

TUa-709 - - IS709 - Continuous-Discontinuous Computational Models for Fracture

Organized by: Prof. Elena Benvenuti (Università degli Studi di Ferrara), Prof. Antonio Rodriguez Ferran (Technical University of Catalonia), Prof. Guglielmo Scovazzi (Duke University)

Chaired by: Prof. Elena Benvenuti (Università degli Studi di Ferrara), Prof. Antonio Rodríguez Ferran (Universitat Politècnica de Catalunya)

A Fourth-order Phase-field Fracture Model: Formulation and Numerical Solution using a Continuous/Discontinuous Galerkin Method

Keynote

L. Svoboda, **H. Mourad***, G. Manzini, K. Garikipati

Enriched Virtual Elements for Two-dimensional Elastic Fracture

E. Artioli*, L. Mascotto

A Locally Adaptive Phase-Field Model with Transition to Fracture

A. Muixi*, O. Marco, S. Fernández-Méndez, A. Rodríguez-Ferran

Recent advances of the regularized extended finite element method for continuous-discontinuous transition and cracking processes

E. Benvenuti*

Discontinuous Galerkin Modeling of Wave Propagation in Damaged Brittle Materials

B. Goument*, J. Zinszner, I. Ionescu

Tue, 05/09/2023 17:00 - 19:00

A3 - 201

TUa-700b - - CT700b - Damage, Fracture, Fatigue and Failure Mechanics

Chaired by: Prof. Dr. Lucia Barbu (CIMNE/UPC)

A continuum damage model for the anisotropic material response of paper and paperboard

B. Boes*, J. Simon

Experimental and Computational Failure Analysis of Fused Filament Fabrication Parts

I. Rivet*, N. Dialami, M. Cervera, M. Chiumenti

Numerical assessment of the influence of cutting operations in the fatigue strength of metals

L. Gonçalves Junior*, S. Jiménez, A. Cornejo, L. Barbu, S. Oller, D. Gustafsson, E. Olsson

Nonlinear Numerical Investigation of Corrugated Steel Plate Shear Walls With Different Geometries

S. Safaeifaegh*, G. Zanon, O. Bursi, E. Safaeifaegh

A coupled inelastic-damage and multi-species transport model for concrete structures degradation

B. Selma*

A Fatigue Design Framework for Additively Manufactured Cellular Materials

D. Barba*, A. Vázquez Prudencio, C. Garrido Fernandez de Vera

Tue, 05/09/2023 17:00 - 19:00

A3 - 105

TUa-900a - - CT900a - Data Science, Machine Learning and Artificial Intelligence

Chaired by: Prof. Stefanie Reese (RWTH Aachen University)

Deep Learning Approach for Coronary In-stent Restenosis Using Physics-informed Neural Networks

J. Shi*, K. Manjunatha, S. Reese

Use of Machine Learning in Determining the Parameters of Viscoplastic Models

J. Halamka*, J. Kuželka, M. Bartošák, M. Španiel

Inverse Design of Voxelized Architected Materials

X. Zheng*, I. Watanabe

Towards the Identification of Crystal Plasticity Laws by Digital Twin and Machine Learning

D. Mesbah*, D. Ryckelynck, H. Proudhon, L. Gelebart

Tue, 05/09/2023 17:00 - 19:00

A3 - 102

TUa-1001b - IS1001b - Recent Advances in Constitutive Model for Soils

Organized by: Prof. Wei Wu (University of Natural Resources and Life Sciences), Prof. Koichi Hashiguchi (MSC Software, Ltd.), Yuki Yamakawa (Tohoku University)

Chaired by: Prof. Wei Wu (University of Natural Resources and Life Sciences, Vienna), Prof. Hashiguchi Hashiguchi (MSC Software, Ltd.), Dr. Yuki Yamakawa (Tohoku University)

A constitutive model for structured soils under saturated and unsaturated conditions

B. Dai*, Q. Mu, C. Zhou

Hyperelastic constitutive models for geomaterials: Extension of existing models to include finite strains and coupling with plasticity

Y. Yamakawa*, A. Ueda

A 3D Discrete Element Model For Studying Soil-Structure Interaction On Shallow Foundations Subjected To Seismic Load

B. Al Tfailly*, R. Aboul Hosn, A. Bennabi, L. Sibille

Forecast System for Rain-Induced Landslides Using Transient Finite Element Digital Twins

S. Commend*, J. Minini, C. Buchs, G. Jacot-Descombes

DEM-CFD Coupling Simulation Research on the Seepage Erosion Process in Underground Structures

X. Liu, **Q. Sun***, S. Fan, W. De Corte, L. Taerwe

Small scale simulations of hydraulic fracturing in rocks with a novel mesoscopic thermo-hydro-mechanical approach

M. Krzaczek*, J. Tejchman

Tue, 05/09/2023 17:00 - 19:00

A3 - 203

TUa-1403a - IS1403a - Applications of Computational Methods to Product and Process Design for Industry

Organized by: Prof. Shohei Kajikawa (The University of Electro-Communications), Prof. Takashi Kuboki (The University of Electro-Communications), Prof. Takahiro Makiyama (Institute of Technologists)

Chaired by: Dr. Shohei Kajikawa (The University of Electro-Communications), Dr. Takahiro Makiyama (Institute of Technologists)

Improved Accuracy of Edge Crack Analysis of High Strength Steel Sheets

S. Okubo*, Y. Otake, S. Nishida, T. Nedachi

Research on Obtaining High Precision Forming Limit Diagram of High Tensile Strength Steel

Y. Otake*, S. Okubo, S. Nishida, T. Nedachi

Analytical Study on Effect of Taper Angle And Roller Diameter on Twist Shape in Twist Rolling

T. Kuboki*, T. Makiyama, A. Kumar, S. Kajikawa

Sheet-Metal Bending Behaviour Considering Strain Rate and Bauschinger Effect in Finite Element Analysis

T. Muraoka*, Y. Okude, S. Kajikawa, T. Kuboki

Relation Between Classic and Fracture Mechanics Applied to the Evaluation of Residual Strength of Corroded Reinforcements

C. Andrade*

Tue, 05/09/2023 17:00 - 19:00

A3 - 001

TUa-1701b - IS1701b - Non-local Models for Plasticity, Fracture and Interfacial Problems

Organized by: Dr. Emilio Martínez-Pañeda (Imperial College London), Prof. Christian Niordson (Technical University of Denmark), Prof. Benjamin Klusemann (Leuphana University of Lüneburg)

Chaired by: Dr. Emilio Martínez-Pañeda (Imperial College London)

How to describe fatigue cracks with Griffith's fracture theory? **Keynote**

R. Alessi*, J. Ulloa

Accelerated Fatigue Crack Growth Analysis Based on Phase Field Modeling

P. Kristensen, A. Golahmar, E. Martínez-Pañeda, **C. Niordson***

Modular phase-field modelling of fatigue fracture

T. Schneider*, M. Kalina, M. Kästner

Phase Field Modelling of Fatigue in Inert and Hydrogen-containing Environments

A. Golahmar*, C. Niordson, E. Martínez-pañeda

A viscous gradient-enhanced damage model for fatigue

H. Kök*, P. Junker

Tue, 05/09/2023 17:00 - 19:00

A3 - 002

TUa-1705b - IS1705b - Multiscale Modeling and Characterisation in Structural Materials

Organized by: Prof. Ikumu Watanabe (National Institute for Materials Science), Prof. Joao Quinta da Fonseca (University of Manchester)

Chaired by: Prof. Joao Quinta da Fonseca (University of Manchester), Prof. Kazumi Matsui (Yokohama National University)

Validating Crystal Plasticity Modelling Predictions of Strain Localization at the Microstructural Scale **Keynote**

J. Quinta da Fonseca*, M. Atkinson, D. Hu, C. Dichtl, D. Lunt

Understanding bending of aluminium sheets through crystal plasticity simulations

L. González Duque*, J. Quinta da Fonseca, J. Robson, E. Cantergiani, Z. Liang, C. Leppin

Crystal plasticity modelling of the effect of microtextured regions on the strain localisation of forged Ti-6Al-4V.

P. Curran*, P. Shanthraj, P. Prangnell, B. Dod, N. Byres, M. Atkinson, A. Plowman, D. Hu, J. Quinta da Fonseca

Tue, 05/09/2023 17:00 - 19:00

A3 - 106

TUa-1704b - IS1704b - Scale Bridging in Material Failure : From Micro- to Macro-scale Modeling and Experimentation

Organized by: Dr. Gergely Molnár (INSA de Lyon /CNRS), Prof. Anthony Gravouil (INSA Lyon), Prof. Guillaume Kermouche (Ecole des Mines de Saint-Etienne)

Chaired by: Dr. Gergely Molnar (INSA de Lyon / CNRS)

From microstructure to fracture toughness

G. Molnar*, S. Lévy

Development of a Homogenized Thermomechanical Model for the Optimized Design of Fiber Optic Gyroscopes

P. Busnel*, J. Pillon, F. Louf, M. Rattier, P. Boucard

Coupling between mechanical stresses and lithium penetration in a lithium ion battery

A. Saidi*, A. Tanguy, M. Fourmeau, G. Molnar, A. Boucherif, D. Machon

Tue, 05/09/2023 19:30 - 21:00

Plaça Telecom

Welcome Reception

Wednesday, 06/09/2023

Wed, 06/09/2023 08:15 - 08:45

Registration

Wed, 06/09/2023 08:45 - 10:30

WEM-PL3 - - Plenary Session III

Chaired by: Prof. Marc Geers (Eindhoven University of Technology)

Vértex Building - Auditorium

Physics-based and data-driven hybrid modelling of materials and their processing

F. Chinesta*

Convoluton Hierarchical Deep Learning Neural Network (C-HiDeNN)-AI: From Topological Optmizaton to Additive Manufactured Materials

W. K. Liu*

Wed, 06/09/2023 10:30 - 10:45

IACM Awards

Vértex Building - Auditorium

Wed, 06/09/2023 10:45 - 11:30

Coffee Break

A3-A4 Building Terrace

Wed, 06/09/2023 11:30 - 13:30

WEM-102b - - IS102b - Virtual Element Method For Engineering Applications

Organized by: Prof. Fadi Aldakheel (Leibniz Universität Hannover), Prof. Edoardo Artioli (Università degli Studi di Roma Tor Vergata), Mr.

Lourenço Beirão Da Veiga (Università di Milano-Bicocca), Prof. Peter Wriggers (Leibniz University of Hannover)

Chaired by: Prof. Fadi Aldakheel (Leibniz Universität Hannover), Prof. Peter Wriggers (Leibniz University of Hannover)

A3 - 202

Some Virtual Element Methods for elasticity problems

C. Lovadina, M. Visinoni*

A Node-Based Uniform Strain Virtual Element Method for Elastoplastic Solids

A. Ortiz-Bernardin*, E. Artioli

A Hu-Washizu Variational Formulation of 2D Self-Stabilized Virtual Elements

M. Cremonesi*, U. Perego, A. Lamperti, A. Russo, C. Lovadina

The high order Bulk-Surface Virtual Element Method in 3D

M. Frittelli*, F. Dassi, A. Madzvamuse

Adaptive Mesh Refinement Procedures for the Virtual Element Method

D. van Huyssteen*, F. Rivarola, G. Etse, P. Steinmann

A Stabilization-free Virtual Element Method for Finite Strain Applications

B. Xu*, P. Wriggers

Wed, 06/09/2023 11:30 - 13:30

WEM-204a - - IS204a - Towards Designing 3D Printed Components with Functionally Graded Metamaterials

Organized by: Prof. Francisco J. Montáns (Universidad Politécnica de Madrid), Prof. Luis Barrales-Mora (Georgia Institute of Technology),

Prof. Francisco Chinesta (ENSAM ParisTech), Dr. Luis Saucedo-Mora (Universidad Politécnica de Madrid)

Chaired by: Phd. Juan Garcia-Martinez (INTA), Dr. Luis Saucedo Mora (Universidad Politécnica de Madrid)

A3 - 101

Melt Track Morphology Based Optimisation in LPBF with Deep Learning

T. Wilkinson*, M. Casata, D. Barba

Investigating the Effect of Size and Orientation on the Quality of LPBF Metamaterial Cells in Ti64

M. Casata*, S. Perosanz Amarillo, D. Barba Cancho

On the Influence of the Lattice Geometry on the Mechanical Properties of Additively Manufactured Metamaterials

C. Garrido*, E. Alabort, D. Barba

Experimental and CPFEM based study on IN738LC superalloy processed by laser powder bed fusion

J. Chen*, J. Xu, J. Moverare, L. Barrales-Mora

A Gibson-Ashby Model for Graded 2D Cellular Solids

M. Beigrezaee*, S. Jalali, D. Misseroni, N. Pugno

Wed, 06/09/2023 11:30 - 13:30

WEM-1300 - - CT1300 - Inverse Problems, Optimization and Design

Chaired by: Prof. Ignacio Romero Olleros (Universidad Politécnica de Madrid), Prof. Miguel Vaz Jr. (State University of Santa Catarina)

A4 - 205

Topology Optimization of Elasto-plastic Microstructure Using FFT-based Homogenization

M. Matsui, H. Hoshiba*, K. Nishiguchi, H. Ogura, J. Kato

Topology Optimization Method for Elastoplastic Multimaterial Models to Improve Toughness

M. Fujiwara*, H. Hoshiba, K. Nishiguchi, J. Kato

Identification of Material Parameters using Multiple Data Sets based on Multi-objective Optimization

M. Vaz Jr.*

Reaction-Diffusion Equation-Based Topology Optimization of Lightweight Elastoplastic Structures by Exact Volume Constraint

Y. Cui*, T. Takahashi, T. Matsumoto

Bayesian Calibration of Complex Models. Application to Elasto-plastic Constitutive Relations under High-strain Rates and Temperature

I. Romero*, J. de Pablos, I. Sabirov

Applications of Elastoplastic Constitutive Model in Surface Design of Bed Mattresses using Finite Element Method

M. Sakurai*, T. Nonomura, Y. Shimura, A. Sakuma, H. Kimura, H. Miyaki, M. Terai

Wed, 06/09/2023 11:30 - 13:30

A3 - 103

WEm-302 - - IS302 - Advances in Computational Mechanics to Address Challenges in Dislocation based Plasticity

Organized by: Dr. Fengxian Liu (University of Twente), Dr. Haiyang Yu (Uppsala University), Prof. Edmund Tarleton (Oxford Micromechanics Group)

Chaired by: Dr. Haiyang Yu (Uppsala University), Dr. Fengxian Liu (University of Twente)

Multiscale crystal plasticity modeling of dislocation structure formation in additively manufactured stainless steel

N. Grilli*, D. Hu, W. Yan

Dislocation climb driven by lattice diffusion and core diffusion

F. Liu*, A. Cocks, E. Tarleton

Atomistically-informed Hardening and Kinetics Models of Helium Bubble in Irradiated Tungsten

C. Ji*, J. Hu, Z. Zhuang, Y. Cui

Propagation of zonal dislocations: the case of the synchroshear mechanism in Laves phases

J. Guénoles*, Z. Xie

An atomistically informed discrete dislocation dynamics study of prior particles boundaries in Ni superalloys

D. Mistry*, P. Guruprasad, A. Ramabathiran

Wed, 06/09/2023 11:30 - 13:30

A4 - 206

WEm-1800c - - CT1800c - Numerical Methods in Science and Engineering

Chaired by: Prof. Peter McHugh (University of Galway) and Dr. Van-Dung Nguyen (University of Liège)

Crystal viscoplastic modelling of UO₂ : impact of dislocation climbing on the recovery creep behavior

S. El Bez*

Improvement of structural plastic design using CFT column

S. Kim*, H. Kwak

Efficient Surrogate Models for Microstructured Materials based on Interaction-based Material Networks

V. Nguyen*, L. Noels

Localization of Plastic Events and Vibrational Modes in Discrete Dislocation Systems

D. Berta*, G. Péterffy, P. Ispánovity

Ruppener Geometry of Strain-Induced Crystallization in Polymers

A. Raza*, D. Roy

Geometrical and Crystal Plasticity Modelling of Effects of Microstructure on Mechanical Properties of Additively Manufactured 316L Stainless Steel Struts

M. Kavousi, **P. McHugh***, P. McGarry, S. Leen

Wed, 06/09/2023 11:30 - 13:30

A3 - 104

WEm-703a - - IS703a - Theory of Fracture, Crack Propagation Criteria, and Crack Tracking Algorithms

Organized by: Prof. Anna Pandolfi (Politecnico di Milano), Prof. Michael Ortiz (Politecnico di Milano)

Chaired by: Prof. Anna Pandolfi (Politecnico di Milano)

New Results on the Jerky Crack Growth in Elastoplastic Materials **Keynote**

G. Dal Maso*, R. Toader

A Model for the Quasistatic Crack Growth in Elasto-plastic Materials with Hardening: the Antiplane Case

G. Dal Maso, **R. Toader***

An Energy Balance-based damage Criterion for an Isotropic Cohesive Zone Model

A. Chrysochoos, **L. Daridon***, M. Renouf

A Two-level Model for the Failure of Fiber-reinforced Concrete

R. Yu*, E. Poveda, G. Ruiz

Toughening Effect of Out-of-crack-path Architected Zones

J. Triclot*, T. Corre, V. Lazarus, A. Gravouil

Wed, 06/09/2023 11:30 - 13:30

A3 - 105

WEm-710a - - IS710a - Fracture in Polymers and Polymer Composites

Organized by: Mr. Wuyang Zhao (Friedrich-Alexander-Universität Erlangen-Nürnberg), Dr. Christian R. Wick (Friedrich-Alexander-Universität Erlangen-Nürnberg), Dr. Fabrice Detrez (University Gustave Eiffel), Dr. Sebastian Pfaller (Friedrich-Alexander-Universität Erlangen-Nürnberg)

Chaired by: Mr. Wuyang Zhao (Friedrich-Alexander-Universität Erlangen-Nürnberg)

A nonlocal multi-scale constitutive modeling of reinforced semi-crystalline polymers **Keynote**

F. Meraghni*, G. Chatzigeorgiou, S. Satouri

A Nonlocal Constitutive Framework for Highly Damaged Semi-crystalline Polymers Undergoing Softening

S. Satouri*, G. Chatzigeorgiou, F. Meraghni, A. Benaarbia

A constitutive model for semi-crystalline polymer deformation involving lamellar fragmentation

F. Detrez*

Formulation and Calibration of a Visco-elasto-plastic-damage Constitutive Model for Fibre-reinforced Polymers

I. Rodrigues Lopes*, P. Gonçalves, F. Danzi, A. Arreiro, F. Andrade Pires, P. Camanho

Optimization of the Additive Manufacturing of Short Hemp Fibers Biocomposites

N. Niang*, T. Barriere, V. Placet, S. Holopainen

Wed, 06/09/2023 11:30 - 13:30

A3 - 201

WEM-700c - - CT700c - Damage, Fracture, Fatigue and Failure Mechanics

Chaired by: Prof. Eric Feulvarch (Ecole Centrale de Lyon)

Crystallographic Texture Evolution

C. Klein*, T. Böhlke

Understanding Crystallographic Effects on Strain Localization in a 6016 Aluminium Alloy under Plane Strain Tension Using Correlative X-ray Lab Tomography

M. Gille*, H. Proudhon, J. Oddershede, T. Morgeneyer

Multiscale plasticity-fracture coupled model of body center cubic metal

Y. Cui*

Crystal Plasticity Simulations of Void Growth

B. Østergaard*, G. Winther, K. Nielsen

A Discrete Cohesive Zone Model for the Modeling of Interface in Adhesively Bonded Laminates and Sandwich Panels

H. Himanshu*, A. Ramaswamy

An Efficient Computational Approach for Critical Plane Type Approaches Dedicated to Fatigue Life Analysis of Structures

F. Fauvin*, J. Roux, E. Feulvarch

Wed, 06/09/2023 11:30 - 13:30

A3 - 205

WEM-900b - - CT900b - Data Science, Machine Learning and Artificial Intelligence

Chaired by: Prof. W.K Liu (Northwestern University)

A Neural Network Interatomic Potential for Crystal Plasticity Mechanisms in Nanoindentation Simulation: The Case of Pure Molybdenum

A. Naghdi Dorabati*, F. Pellegrini, E. Kucukbenli, J. Dominguez, D. Massa, E. Kaxiras, S. Papanikolaou

Efficient Data Handling for Artificial Neural Networks by Physics-Based Rao-Blackwellization for Material Modeling Problems

G. Geuken*, P. Kurzeja, J. Mosler

Modeling Elastoplastic Constitutive Behavior Using Physics-Informed Neural Networks

L. Santos*, C. Mejia, D. Roehl

Using Neural Networks in Hardening Laws

K. Meyer*, F. Ekre, R. Jänicke

Wed, 06/09/2023 11:30 - 13:30

A3 - 102

WEM-1004a - - IS1004a - Complas in Geomechanics

Organized by: Prof. Ronaldo I. Borja (Stanford University), Prof. WaiChing Sun (Columbia University), Prof. Wei Wu (University of Natural Resources and Life Sciences)

Chaired by: Prof. Ronaldo Borja (Stanford University)

Phase-field Modeling of Fractures in Geomaterials

J. Choo*, F. Fei

Phase-field modelling of dynamic strain localization into compaction bands in high-porosity rocks

Y. Wang*, R. Borja, W. Wu

Role of plasticity in induced seismicity and its mitigation

X. Zhao, **B. Jha***

Fault Rupture Orientation under Diverse Loading Conditions in SPH Simulations

E. del Castillo*, R. Borja

Fault Friction Under Thermal Pressurization During Large Seismic Slip

A. Stathas, I. Stefanou*

Wed, 06/09/2023 11:30 - 13:30

A3 - 203

WEM-1403b - - IS1403b - Applications of Computational Methods to Product and Process Design for Industry

Organized by: Prof. Shohei Kajikawa (The University of Electro-Communications), Prof. Takashi Kuboki (The University of Electro-Communications), Prof. Takahiro Makiyama (Institute of Technologists)

Chaired by: Dr. Takahiro Makiyama (Institute of Technologists), Prof. Takashi Kuboki (The University of Electro-Communications)

Application of Material-properties Prediction Method Based on Area Reduction in Drawing to Spinner-straightening Analysis

T. Komatsu*, S. Kajikawa, S. Inoue, H. Matsumura, H. Seimiya, T. Kuboki

Virtual Compression Test by Multi-Scale Approach with Wood Cell Model

S. Kajikawa*, S. Oda, T. Kuboki, M. Kondo, M. Abe, M. Seki, T. Miki, E. de Souza Neto

Prediction of Crack Initiation Around Punch Cutting Edge In Finish Blanking

M. Sasada*, K. Imada, S. Fuma, T. Tanaka

Effects of Combinations of Rotational and Axial Feed on Forged Shape in Mandrel-Less Incremental Forging of Circular Tube

T. Makiyama*

Wed, 06/09/2023 11:30 - 13:30

A3 - 001

WEM-1701c - - IS1701c - Non-local Models for Plasticity, Fracture and Interfacial Problems

Organized by: Dr. Emilio Martinez-Pañeda (Imperial College London), Prof. Christian Niordson (Technical University of Denmark), Prof. Benjamin Klusemann (Leuphana University of Lüneburg)

Chaired by: Prof. Christian Niordson (Technical University of Denmark)

Emergent fault friction and short-slip in a continuum model of rupture dynamics Keynote

A. Arora, **A. Acharya***, J. Bielak

The Elastic Threshold for Size-dependent Plasticity and Comparison with Experiments

D. Reddy, **S. Sysala***

Modelling of size effects in spherical indentation of a single crystal

M. Ryś*, S. Stupkiewicz, H. Petryk

Towards a Generalised Phase Field Fracture Driving Force Based on the Constitutive Behavior of Materials

Y. Navidtehrani*, C. Betegón, E. Martínez Pañeda

Development of Thermoplastic Constitutive Models for Refractory Ceramics in Wide Temperature Range

L. Fiore*, A. Piccolroaz, S. Romero Baivier

Wed, 06/09/2023 11:30 - 13:30

A3 - 002

WEM-1703a - - IS1703a - Multi-scale and Computational Scale Bridging

Organized by: Dr. Varvara Kouznetsova (Eindhoven University of Technology), Prof. Jörg Schröder (University Duisburg-Essen), Prof. Kenjiro Terada (Tohoku University)
Chaired by: Prof. Kenjiro Terada (Tohoku University)

A Multiscale Phase Field Fracture Approach for Rubber-like Materials **Keynote**

C. Linder*, P. Arunachala

Computational Homogenization of Heterogeneous Porous Solids Saturated by a Dissipative Fluid

R. Liupekevicus*, H. van Dommelen, M. Geers, V. Kouznetsova

Computationally Efficient Modelling of Short Fiber Composites Across Different Length Scales

M. Mirkhalaf*, B. Castricum, T. van Beurden, M. Ekh, F. Larsson, M. Fagerström

Transient Thermo-Mechanically Coupled Analysis for Dissipative Composites Considering Periodicity of Perturbed Temperature

S. Matsubara*, S. Nagashima, D. Okumura, K. Terada

Differential homogenization models for the macroscopic response and field statistics of elasto-viscoplastic polycrystals

P. Ponte Castañeda*, S. Das

Wed, 06/09/2023 11:30 - 13:30

A3 - 106

WEM-1702a - - IS1702a - Phase-Field Modeling and Engineering Applications in Solid Mechanics

Organized by: Prof. Hector Gomez (Purdue University), Prof. Thomas J. R. Hughes (University of Texas at Austin), Prof. Laura De Lorenzis (Eidgenössische Technische Hochschule Zürich), Dr. Guillermo Lorenzo (University of Pavia), Prof. Ernst Rank (Technical University of Munich), Prof. Alessandro Reali (University of Pavia)
Chaired by: Dr. Guillermo Lorenzo (University of Pavia)

Phase-Field Modeling of Fracture in Heterogeneous Materials **Keynote**

M. Kästner*, A. Hansen-Dörr

Modelling crack propagation during relaxation of cross-linked polymers

P. Sharma*, S. Diebels

Application of Multiphase-Field Method to Microstructure Evolution Considering Crystal Plasticity

A. Prahs*, L. Schöller, T. Kannenberg, D. Schneider, B. Nestler

Multi-Resolution Phase-Field Formulations Using Higher Order Immersed Boundary Methods

E. Rank*, T. Buerchner, L. Hug, P. Kopp, O. Oztoprak, S. Kollmannsberger

Wed, 06/09/2023 13:30 - 14:30

A3-A4 Building Terrace

Lunch Break

Wed, 06/09/2023 14:30 - 16:30

Vèrtex Building - Auditorium

WEa-PL4 - - Plenary Session IV

Chaired by: Prof. Francisco Chinesta

High-resolution Computational Plasticity at the Micron Scale

M. Geers*

Interactions of dislocations and twins with grain boundaries: unraveling the mechanisms of plastic deformation in polycrystals

J. Llorca*

Enhancing Material Point Method for Disaster Simulation

K. Terada*

Wed, 06/09/2023 16:30 - 17:00

A3-A4 Building Terrace

Coffee Break

Wed, 06/09/2023 17:00 - 19:00

A3 - 202

WEa-103a - - IS103a - Meshfree, Particle, and Peridynamic Methods

Organized by: Prof. J.S Chen (University of California), Prof. John Foster (University of Texas), Prof. Mike Hillman (Karagozian & Case), Dr. Pablo Seleson (Oak Ridge National Laboratory)
Chaired by: Dr. Mike Hillman (Karagozian and Case Inc.)

A Neural Network-enhanced Reproducing Kernel Particle Method for Modeling Localization and Fracture

J. Chen*, J. Baek

Accurate Absorbing Boundary Conditions in Peridynamics: Part II – Elastic Waves

A. Shojaei*, A. Hermann, P. Seleson, T. Rabczuk, S. Silling, C. Cyron

A 3D Peridynamic Model for Elastoplastic Materials with Isotropic and Kinematic Hardening

U. Galvanetto*, A. Pirzadeh, F. Dalla Barba, L. Sanavia, F. Bobaru, M. Zaccariotto

Numerical Simulation Of The Extrusion Process Of Viscoplastic Materials Using a Radial Point Interpolation Method

D. Rodrigues*, J. Belinha, R. Natal Jorge

Coupled multiphysics large deformation problems using MPM

A. Larese*, V. Singer, L. Moreno, A. Boerst, N. Crescenzo, R. Wuechner

A novel Arbitrary Lagrangian Eulerian system of conservation laws for fast solid dynamics

A. Gil*, C. Lee, J. Bonet

Wed, 06/09/2023 17:00 - 19:00

A3 - 101

WEa-204b - - IS204b - Towards Designing 3D Printed Components with Functionally Graded Metamaterials

Organized by: Prof. Francisco J. Montáns (Universidad Politécnica de Madrid), Prof. Luis Barrales-Mora (Georgia Institute of Technology), Prof. Francisco Chinesta (ENSAM ParisTech), Dr. Luis Saucedo-Mora (Universidad Politécnica de Madrid)
Chaired by: Prof. Francisco Javier Montáns Leal (Universidad Politécnica de Madrid), Prof. Francisco Chinesta (ESI GROUP Chair, ENSAM ParisTech)

Finite Strain and Instability Analysis of Functionally-Graded Thin Auxetic Materials

S. Pamulaparthi Venkata*, M. Destrade, V. Balbi, D. Accoto, S. Coppieters, G. Zurlo

Topological Classification and Optimization of Randomized Metamaterial Architectures

L. Irastorza-Valera*, F. Chinesta, L. Saucedo-Mora

Investigating the Applicability of Beam Elements in Two-scale FE2 Computational Homogenization of Truss-based Mechanical Metamaterials

H. Danesh*, T. Brepols, S. Reese

Optimality processing conditions and forming induced properties

F. Ebrahimi*, S. Rodriguez, D. Di Lorenzo, F. Chinesta

Modelling and simulation of 3D microstructure evolution in selective laser melting by means of a parallelized cellular automaton model

A. Singh*, L. Barrales-Mora

Comparing machine learning and analytical models in nonlinear elasticity

A. Alibakhshi*, J. Benítez, L. Saucedo Mora, F. Javier Montáns

Wed, 06/09/2023 17:00 - 19:00

A4 - 205

WEa-1800a - - CT1800a - Numerical Methods in Science and Engineering

Chaired by: Prof. Ramon Codina (CIMNE/UPC) and Mr. Sacha Wattel (EPFL)

An improved material point method for frictional contact problems involving phase field fracture

E. Kakouris*

A Nodal-Based Finite Element Implementation of Plasticity and Damage Models Using a Stress-Displacement Formulation

R. Codina*

Computational Homogenization With Tensor-train-based Preconditioners

L. Risthaus*, M. Schneider

A Mixed Approximation for Nonlinear Elasticity Using Finite Element Exterior Calculus

J. Nagaraja*, D. Roy

A structure-preserving integrator for incompressible finite elastodynamics based on a grad-div stabilized mixed formulation

J. Guan*, H. Yuan, J. Liu

The D-Refinement Method for the Efficient Simulation of Locally Non-Linear Problems

S. Wattel*, J. Garcia-Suarez, J. Molinari

Wed, 06/09/2023 17:00 - 19:00

A3 - 103

WEa-303a - - IS303a - Discrete-to-Continuum Coupling in Plasticity

Organized by: Prof. Markus Hütter (Eindhoven University of Technology), Dr. Bob Svendsen (RWTH Aachen University)

Chaired by: Prof. Markus Hütter (Eindhoven University of Technology), Dr. Bob Svendsen (RWTH Aachen University)

Thermodynamics of dislocation plasticity

V. Berdichevsky*

On the dynamics of curved dislocation ensembles

I. Groma*, P. Ispánovity, T. Hochrainer

Kinetic Closure of Continuum Dislocation Dynamics from Discrete Dislocation Data

B. Weger*, T. Hochrainer

Statistical underpinning of 3d continuum dislocation dynamics

A. El-Azab*, J. Anderson

Data-mining of Dislocation Microstructures

S. Sandfeld*

Wed, 06/09/2023 17:00 - 19:00

A4 - 206

WEa-500a - - CT500a - Biomechanics

Chaired by: Prof. Suarez Guerrero (Institución Universitaria Pascual Bravo) and Prof. Atsushi Sakuma (Kyoto Institute of Technology)

Optimal Control of Worm locomotion

A. Bijalwan, **J. Munoz***

Evaluation of the Impact-induced Brain Injury through Numerical Simulation using Elastoplastic Constitutive Model

K. Shimomura, **A. Sakuma***, Y. Zhang, M. Terai, H. Miyaki, R. Suzuki

Comparison of Mechanical Behavior of Bioresorbable Material for Additive Manufacturing of Vascular Replacements and its Gore-Tex Counterparts

L. Horný*, Z. Sobotka, H. Chlup, K. Mendová, Z. Petřivý, M. Kohan, T. Balint, M. Schnitzer

MR Damper for Artificial Knee Joint: Concept Design and Performance Assessment

S. Seid*

A robust and efficient material model for shape memory alloys with medical application

C. Erdogan*, T. Bode, P. Junker

Wed, 06/09/2023 17:00 - 19:00

A3 - 104

WEa-703b - - IS703b - Theory of Fracture, Crack Propagation Criteria, and Crack Tracking Algorithms

Organized by: Prof. Anna Pandolfi (Politecnico di Milano), Prof. Michael Ortiz (Politecnico di Milano)

Chaired by: Prof. Kerstin Weinberg (Universität Siegen)

Anisotropic Phase-Field Modeling of In-Plane Ductile Fracture in Paperboard Keynote

A. Marengo, **U. Perego***

A Fracture Multiscale Model for Peridynamic enrichment within the Partition of Unity Method

P. Diehl*

Extracting interfacial toughness for crack path predictions using graphs

S. Tsopanidis*, S. Osovski

Eigenerosion: Theoretical Concepts and Practical Applications

M. De Bellis, M. Ortiz, **A. Pandolfi***

Wed, 06/09/2023 17:00 - 19:00

A3 - 105

WEa-710b - - IS710b - Fracture in Polymers and Polymer Composites

Organized by: Mr. Wuyang Zhao (Friedrich-Alexander-Universität Erlangen-Nürnberg), Dr. Christian R. Wick (Friedrich-Alexander-Universität Erlangen-Nürnberg), Dr. Fabrice Detrez (University Gustave Eiffel), Dr. Sebastian Pfaller (Friedrich-Alexander-Universität Erlangen-Nürnberg)

Chaired by: Dr. Fabrice Detrez (University Gustave Eiffel)

3D Modelling of plasticity and failure in glassy polymers **Keynote**

R. Estevez*

Microstructure Generation and Full-field Multi-scale Analyses for Short Fibre Reinforced Thermoplastics

F. Praud*, K. Schneider, G. Chatzigeorgiou, F. Meraghni

Modelling mechanochemical reactions in epoxy resins using hybrid QM/MM/MD approaches.

A. Suncana-Smith*, C. Wick

Interphase properties of polymer nanocomposites and their role in material failure

S. Pfaller*, M. Ries

Fracture of Glassy Thermoplastics Based on Multiscale Simulations Across Molecular and Continuum Scales

W. Zhao*, S. Pfaller

Wed, 06/09/2023 17:00 - 19:00

A3 - 201

WEa-700d - - CT700d - Damage, Fracture, Fatigue and Failure Mechanics

Chaired by: Prof. Miguel Cervera (CIMNE/UPC)

A Modified Fully Implicit Cutting Plane Method Based Stress Integration Algorithm and its Verification Using Drucker Prager Model

M. Dharmasiri, **M. Lalith***, K. Fujita, T. Ichimura, M. Hori

An Implicit Stress Update Algorithm Based on Primal-dual Interior Point Method for GTN Model

Y. Shintaku*, T. Inaoka, K. Terada

Objectivity in the Finite Element Analysis of Quasi-Brittle Failure Via Adaptive Mesh and Formulation Refinement

G. Barbat*, M. Cervera, C. Moreira, H. Venghaus, M. Chiumentì

Numerical Experiments to Assess the Behavior of Finite Elements with Embedded Strong Discontinuities

D. Cavalcanti*, C. Mejia, D. Roehl, L. Martha

A View on Validating Crack Propagation Prediction with Shape Optimization by Means of a Phase-Field Model

C. Kandekar, **T. Suchan***, W. Weber, K. Welker

Physics-Informed Neural Network for Forming Limit Curves Prediction

B. Erice*, D. Araya, J. Mendiguren, J. Gomez

Wed, 06/09/2023 17:00 - 19:00

A3 - 205

WEa-1802 - - IS1802 - Computational Structural Stability

Organized by: Prof. Herbert Mang (Vienna University of Technology), Prof. Yeong-Bin Yang (Chongqing University)

Chaired by: Prof. Herbert Mang (Vienna University of Technology), Prof. Yeong-Bin Yang (Chongqing University)

Differential Geometric Split of the Strain Energy of Proportionally Loaded Structures **Keynote**

M. Aminbaghai*, J. Kalliauer, A. Wagner, H. Mang

An Enhanced Vehicle Model Concerning Pitching Responses for VSM

J. Yang*, C. Wang

Internal Instability of Thin-Walled Girder Bridges under Harmonic Moving Loads

Y. Yang*, K. Shi, X. Mo

Semi-analytical modelling of mode jumping phenomena in pressurized fuselage panels

A. Alhajahmad*, C. Mittelstedt

Wed, 06/09/2023 17:00 - 19:00

A3 - 102

WEa-1004b - - IS1004b - Complas in Geomechanics

Organized by: Prof. Ronaldo I. Borja (Stanford University), Prof. WaiChing Sun (Columbia University), Prof. Wei Wu (University of Natural Resources and Life Sciences)

Chaired by: Prof. Wei Wu (University of Natural Resources and Life Sciences, Vienna)

Thermo-hydro-mechanical Coupled Material Point Method for Simulating Landslide

C. Zhou*, Z. Zhan, C. Liu

Simulating Earthquake-induced Large Deformation Using Material Point Method

Z. LYU*, G. WANG

Multiscale modeling of wave propagation in saturated granular material

W. Liang*, Z. Yin, J. Zhao, K. Soga

Fully resolved CFD-DEM modeling of fluid-particle interactions involving irregularly shaped particles

J. Zhao*, Z. Lai, S. Zhao

A Constitutive Model (CASME) for Internal Erosion and Its Applications

G. Ma, V. Nguyen, G. Nguyen, **H. Bui***

Effect of Pore Habits on Mechanical Behavior of Methane Hydrate Bearing Sediments based on a Comprehensively Calibrated DEM Model

P. Wang*, C. Xu, X. Gao, Z. Yin

Wed, 06/09/2023 17:00 - 19:00

A3 - 203

WEa-1400a - - CT1400a - Manufacturing and Material Forming Processes

Chaired by: Prof. Ekkehard Ramm (University of Stuttgart) and Mr. Henning Venghaus (CIMNE/UPC)

Effect of JCO-E Steel Pipe Manufacturing Process on the Mechanical Properties and Structural Integrity of Offshore Pipelines

A. Stamou*, S. Karamanos

Modular FE-Modeling of Heavy Plate Rolling Processes using Customized Model Reduction Approaches

A. Nemetz*, E. Parteder, P. Reimer, T. Kaltenbrunner, B. Heise, J. Lekue, T. Gross, S. Falkner, R. Egger, K. Zeman

Modeling of the Compaction Shot-Peening Process of an Al Multiparticulate Coating

L. Eschard*, R. Kubler, L. Barrallier, F. Deloye, L. Gani

Improved Sheet Metal Forming Simulations using higher Order Shell Elements

T. Willmann, M. Schilling, **E. Ramm***, M. Bischoff

Modelling of wet cutting processes for turning simulations

B. Bock-Marbach*, J. Kuhnert

A Comprehensive Framework for Accurate and Efficient Simulation of Friction Stir Welding Processes

H. Venghaus*, M. Chiumenti, J. Baiges, D. Juhre, N. Dialami, A. Segatori

Wed, 06/09/2023 17:00 - 19:00

A3 - 001

WEa-1701d - - IS1701d - Non-local Models for Plasticity, Fracture and Interfacial Problems

Organized by: Dr. Emilio Martínez-Pañeda (Imperial College London), Prof. Christian Niordson (Technical University of Denmark), Prof. Benjamin Klusemann (Leuphana University of Lüneburg)

Chaired by: Prof. Christian Niordson (Technical University of Denmark)

Discrete Dislocation Plasticity Modelling of - Type Irradiation Loops in Zirconium

R. Kumar, D. Hortelano-Roig, E. Tarleton, **D. Balint***

FFT-based phase-field modeling for fatigue short cracks in polycrystals

S. Lucarini*, F. Dunne, E. Martínez-Pañeda

Incipient plasticity in nanoindentation modelled by discrete dislocation plasticity

H. Yu*

Coupling hydrogen effects to plastic degradation in phase field fracture modelling

A. Diaz*, E. Martínez-Pañeda, I. Cuesta, L. Peral, J. Alegre

Propagation of Diffusion-Assisted Intergranular Cracks in Polycrystals

K. Auth*, J. Brouzoulis, M. Ekh

Keynote

Wed, 06/09/2023 17:00 - 19:00

A3 - 002

WEa-1703b - - IS1703b - Multi-scale and Computational Scale Bridging

Organized by: Dr. Varvara Kouznetsova (Eindhoven University of Technology), Prof. Jörg Schröder (University Duisburg-Essen), Prof.

Kenjiro Terada (Tohoku University)

Chaired by: Prof. Dennis M. Kochmann (ETH Zürich, Switzerland)

Dislocation-crystal Plasticity Simulation for Investigation of Grain Size Dependency in Dual Phase Steel

M. Muramatsu*, M. Suzuki, K. Shizawa

Computational and analytical scale-bridging methods to model creep in lamellar metals

A. Dyck*, L. Beifuß, T. Böhlke

Towards a two-scale Analysis of Residual Stresses in 3D

S. Hellebrand*, D. Brands, J. Schröder

Network approach for the analysis of the plastic deformation of ductile solids containing porosities

J. Hund*, V. Kouznetsova, L. Alessandretti, T. Andriollo

Strain gradient plasticity based on saturating internal variables

M. Abatour*, S. Forest

Keynote

Wed, 06/09/2023 17:00 - 19:00

A3 - 106

WEa-1702b - - IS1702b - Phase-Field Modeling and Engineering Applications in Solid Mechanics

Organized by: Prof. Hector Gomez (Purdue University), Prof. Thomas J. R. Hughes (University of Texas at Austin), Prof. Laura De Lorenzis (Eidgenössische Technische Hochschule Zürich), Dr. Guillermo Lorenzo (University of Pavia), Prof. Ernst Rank (Technical University of Munich), Prof. Alessandro Reali (University of Pavia)

Chaired by: Prof. Ernst Rank (Technical University of Munich)

Biomechanical interplay between benign prostatic hyperplasia and prostate cancer

G. Lorenzo*, T. Hughes, T. Yankeelov, H. Gomez, A. Reali

Patient-specific optimization problems for a tumor growth model with angiogenesis

A. Agosti*, A. Giotta Lucifero, S. Luzzi

Computational modelling of cell motility within degradable hydrogel scaffolds

P. Gaziano*, M. Marino

A Phase-Field Approach for an Effective Description of Electrochemical Machining

J. Waimann*, S. Reese, C. Niordson

Thursday, 07/09/2023

Thu, 07/09/2023 08:15 - 08:45

Registration

Thu, 07/09/2023 08:45 - 10:45

A3 - 202

THm-103b - - IS103b - Meshfree, Particle, and Peridynamic Methods

Organized by: Prof. J.S Chen (University of California), Prof. John Foster (University of Texas), Prof. Mike Hillman (Karagozian & Case), Dr. Pablo Seleson (Oak Ridge National Laboratory)

Chaired by: Prof. J.S Chen (University of California, San Diego)

Convolution Hierarchical Deep Learning Neural Network (C-HiDeNN) for Plasticity

W. Liu*, J. Guo, S. Mojumder, D. Qian

Accurate Absorbing Boundary Conditions In Peridynamics: Part I – Scalar Waves

A. Hermann*, A. Shojaei, P. Seleson, S. Silling, C. Cyron

How Do We Chose The Parameters In The RK And MLS Approximations?

M. Hillman*, D. Wilmes, J. Magallanes

A multi-adaptive framework to enhance the computational performance of bond-based peridynamic models

G. Ongaro*, A. Shojaei, F. Mossaiby, A. Hermann, C. Cyron, P. Trovalusci

Buildability Modeling of 3D-Printed Concrete: A Peridynamic Simulation

J. Zhu*, X. Ren, M. Cervera

Implementation of a Bounding Surface Elasto-plastic Model for Unsaturated Porous Media Using a Meshfree Method

A. Khoshghalb*, O. Ghaffaripour, G. Esgandani, B. Shahbodagh

Thu, 07/09/2023 08:45 - 10:45

A3 - 101

THm-204c - - IS204c - Towards Designing 3D Printed Components with Functionally Graded Metamaterials

Organized by: Prof. Francisco J. Montáns (Universidad Politécnica de Madrid), Prof. Luis Barrales-Mora (Georgia Institute of Technology), Prof. Francisco Chinesta (ENSAM ParisTech), Dr. Luis Saucedo-Mora (Universidad Politécnica de Madrid)

Chaired by: Dr. Luis Saucedo Mora (Universidad Politécnica de Madrid), Prof. Francisco Javier Montáns Leal (Universidad Politécnica de Madrid)

Model Order Reduced and Self-defined Topology Optimisation Methodology for Vibration Suppression Using Metamaterials

K. Bhat*, I. Martinez Teres, L. Saucedo Mora, F. Javier Montans, J. Garcia-Martinez

An Efficient Procedure For Multiscale Structural Simulation Of Metamaterials

F. San Millan, **J. Garcia-Martinez***, K. BHAT, L. Saucedo-Mora, I. Martinez Teres, F. Montans

Robust topology optimisation of lattice structures with spatially correlated imperfections

I. Ben-Yelun*, A. Yuksel, F. Cirak

From Micro to Macro: A Unified Approach for Modeling the Mechanical Response for Functionally Graded Metamaterials

V. Yanes Francisco*, A. Ramirez Torres, M. Sanz Gomez, F. Montans Leal

Topological Optimization For Components Of Orthotropic Materials With Dirichlet And Neumann Boundary Conditions

L. Saucedo Mora*, I. Ben-Yelun, M. Sanz, F. Montans

Thu, 07/09/2023 08:45 - 10:45

A4 - 205

THm-1800b - - CT1800b - Numerical Methods in Science and Engineering

Chaired by: Prof. Xavier Oliver (UPC/CIMNE)

Novel global iterative schemes for large rotation finite element analysis of beams and shells with nonlinear materials

D. Magisano*, A. Corrado, G. Garcea

Generalized fiber model for the elastoplastic analysis of beams with normal stress-shear stresses interaction

D. Magisano*, G. Garcea

Energy Based Criteria to Assess the Fire Resistance of Restrained Steel Columns

P. Dias Simão*, J. Correia Rodrigues

Viscoplastic Modelling and Yield Criterion for ETFE Membranes

L. Seixas*, M. Penasa, F. Bosi

A Framework For Designing Shape Memory Alloy Smart Devices

C. Garrido*, D. Barba

Micromechanics of Indentation of Metallic Honeycombs

B. Karthikeyan*, N. K. Sundaram

Thu, 07/09/2023 08:45 - 10:45

A3 - 103

THm-303b - - IS303b - Discrete-to-Continuum Coupling in Plasticity

Organized by: Prof. Markus Hütter (Eindhoven University of Technology), Dr. Bob Svendsen (RWTH Aachen University)

Chaired by: Prof. Markus Hütter (Eindhoven University of Technology), Dr. Bob Svendsen (RWTH Aachen University)

Microscopic View on Plasticity in Polymer Glasses

G. Vogiatzis*, L. van Breemen, M. Hütter, D. Theodorou

The Energetics of Disconnections in Grain Boundaries

H. Joshi, I. Chesser, B. Runnels, **N. Admal***

Pseudo-Continuum Characterization of Discrete Kinematic Results from Experiment and Simulation

B. Svendsen*

Crystal Defects Description: Towards a Discrete-to-Continuum Crossover

H. Kharouji*, L. Dezerald, P. Hirel, P. Corider, P. Carrez, V. Taupin, J. Guérolé

Coupling Discrete Dislocation Dynamics and Phase Field for First Strain Gradient Materials

M. Budnitzki*, R. Strobl, S. Sandfeld

Thu, 07/09/2023 08:45 - 10:45

A4 - 206

THm-500b - - CT500b - Biomechanics

Chaired by: Ms. Ana Lisac (University of Zagreb)

A variational approach to the modeling of multi-species biofilm growth

M. Soleimani*, F. Klempt, P. Junker

Numerical Study of an Arterial Adaptation to the Implementation of a Simplified Stent

A. Lisac*, L. Virag, I. Karšaj

Local Micromorphic Non-affine Anisotropy Applied to Biological Tissue

S. Skatulla*, C. Sansour, G. Limbert

Thu, 07/09/2023 08:45 - 10:45

A3 - 104

THm-704 - - IS704 - Challenges in Non-local Structural Mechanics

Organized by: Prof. Daniel Juhre (Otto von Guericke University Magdeburg), Konstantin Naumenko (Otto von Guericke University Magdeburg)

Chaired by: Prof. Daniel Juhre (Institute of Mechanics / Otto von Guericke University Magdeburg), Prof. Konstantin Naumenko (Otto-von-Guericke-University Magdeburg)

A Gradient-Extended Anisotropic Damage Model for Large Deformations

T. Brepols*, T. van der Velden, H. Holthusen, S. Reese

Coupling of Peridynamics with Finite Element Analysis - A Case Study

A. Parnatli*, U. Gabbert, C. Willberg, J. Hesse

Sensor-Data-Driven Crack Path Estimation Using Coupled Inverse Finite Element Method with Peridynamics

A. Kefal*, E. Oterkus

Rate- and Temperature-dependent Fracture Phenomena: Experimental Investigation and Phase-field Modelling

F. Dammaß*, M. Kästner

On the modelling of viscoelastic properties of filled and unfilled rubber blends

D. Juhre*, J. Voges

Thu, 07/09/2023 08:45 - 10:45

A3 - 105

THm-801 - - IS801 - Data-driven Mechanics for Inelastic Material Behaviours - Recent Advances and Perspectives

Organized by: Prof. Stefanie Reese (RWTH Aachen University), Prof. Laurent Stainier (Centrale Nantes), Dr. Adrien Leygue (Centrale Nantes), Prof. Michael Ortiz (California Institute of Technology)

Chaired by: Prof. Stefanie Reese (RWTH Aachen University)

Comparison of Different Approaches Considering Physical Properties in ANN Material Modeling for Plasticity

P. Weber*, W. Wagner, S. Freitag

Reduced-Order Polycrystalline Texture Representation

J. Jin, P. Breittkopf, **L. Cauvin***, A. Leclerc, B. Li, M. Mayer Grigoletto, B. Raghavan

On the use of PGD-Approximation for Prediction of Evolving Plasticity in Wheel-Rail Contact

C. Ansin*, F. Larsson, R. Larsson, M. Ekh

A Data-Driven Framework for Multiscale Material Analysis

E. Prume*, C. Gierden, S. Reese

Data-driven mechanics for materials with microstructure

K. Weinberg*

Thu, 07/09/2023 08:45 - 10:45

A3 - 201

THm-700e - - CT700e - Damage, Fracture, Fatigue and Failure Mechanics

Chaired by: Prof. Yuichi Shintaku (University of Tsukuba)

Fracture Modelling in Pre-flawed Marble Specimens during Uniaxial compression with 3D DEM

D. Tomporowski, **J. Tejchman***

A Cohesive Traction Embedded Constitutive law Combined With Shear-Induced Damage for Cyclic Loading under Various Stress States

R. Tao*, Y. Shintaku, K. Terada

Numerical Predictions for an Anisotropic Material Containing Ellipsoidal Voids and Exhibiting Tension-compression Asymmetry.

S. Hashem-Sharifi*

Fast Computations of Peridynamic Models for Ductile Failure

F. Bobaru*, F. Mousavi, S. Jafarzadeh

Modeling low cycle fatigue and considering the influence of forming-induced pre-damage

K. Langenfeld*, P. Kurzeja, J. Mosler

On optimization of heterogeneous materials for resistance to bulk fracture

S. Singh*, L. Pflug, M. Stingl

Thu, 07/09/2023 08:45 - 10:45

A3 - 205

THm-902b - - IS902b - Physics-informed and Augmented Learning in the Mechanics of Materials

Organized by: Prof. Francisco Chinesta (ESI GROUP Chair, ENSAM ParisTech), Prof. Elias Cueto (Universidad de Zaragoza), Prof. Benjamin Klusemann (Leuphana University of Lüneburg), Prof. Francisco J. Montáns (Universidad Politécnica de Madrid)

Chaired by: Prof. Benjamin Klusemann (Leuphana University of Lüneburg), Prof. Francisco Javier Montáns Leal (Universidad Politécnica de Madrid)

Machine learning enhanced shell element formulation for the mechanical response of thin to thick structures

A. Pasquale*, M. Ziane, A. Ammar, F. Chinesta

A time multiscale based data-driven approach in cyclic elasto-plasticity

S. Rodriguez*, A. Pasquale, K. Nguyen, A. Ammar, E. Cueto, F. Chinesta

Learning data-driven reduced inelastic models of spot-welded patches

F. Daim*, D. Di Lorenzo, Y. Tourbier, A. Ammar, E. Cueto, F. Chinesta

Physically-inspired kernels and data augmentation for nonlinear model order reduction

P. Díez*, S. Zlotnik, A. Muixi, A. García Gonzalez

Thu, 07/09/2023 08:45 - 10:45

A3 - 102

THm-1004c - - IS1004c - Complas in Geomechanics

Organized by: Prof. Ronaldo I. Borja (Stanford University), Prof. WaiChing Sun (Columbia University), Prof. Wei Wu (University of Natural Resources and Life Sciences)

Chaired by: Prof. WaiChing Sun (Columbia University)

High-dimensional symbolic regression via neural feature polynomials for interpretable machine learning plasticity

B. Bahmani*, H. Suh, W. Sun

Machine Learning Surrogate Modeling of Geomaterials for Finite Element Analysis

S. Semnani*

Interpretable Data-Driven Constitutive Modelling of Soils with Sparse Data

P. Zhang*, Z. Yin, B. Sheil

A Physics-informed Deep Learning-FEM Coupling Framework for Small-Strain Boundary Value Problem

N. Zhang*, Z. Yin, Y. Jin, K. Li

Limit and shear strength reduction analyses in geotechnical stability

S. Sysala*

Thu, 07/09/2023 08:45 - 10:45

A3 - 203

THm-1400b - - CT1400b - Manufacturing and Material Forming Processes

Chaired by: Mr. Dhairaysheel Patil (Alloyed) and Dr. In Yong Moon (Korea Institute of Industrial Technology)

FE-Assisted Generative Model for Dynamic Recrystallization Behavior during Hot Forging

I. Moon*, H. Jeong, K. Jung, S. Kang

Modeling of Rough Contact Interfaces with Trapped Compressive Liquid Pockets

P. Alavi*, L. Rocchi, J. Richard, C. Leppin, G. Anciaux, J. Molinari

A Reduced Order Based Metamodel for Parametric Computational Studies of Local Post Weld Heat Treatment

L. Cimatti Lucarelli*, N. Blal, A. Gravouil, A. Platzer, D. Iampietro, T. Potin

Multiscale Simulation Chain for the Simulation and Optimization of Components Made of Long Fiber Reinforced Polymers

J. Köbler*, M. Kabel, H. Andrä, F. Welschinger, A. Kech, M. Ersch, R. Schirmacher, S. Mönlich, J. Wolters, N. Mentges, F. Di Batista, C. Hopmann, F. Fritzen

Improving the laser powder bed fusion processability of copper alloys and assessing the printability of complex structures along with thermal properties

D. Patil*, E. Alabort

Density prediction model of superconducting MgB₂ wire during multi-pass drawing processes

Y. Oh*, H. Lee, K. Chung, S. Kang

Thu, 07/09/2023 08:45 - 10:45

A3 - 001

THm-1701e - - IS1701e - Non-local Models for Plasticity, Fracture and Interfacial Problems

Organized by: Dr. Emilio Martínez-Pañeda (Imperial College London), Prof. Christian Niordson (Technical University of Denmark), Prof.

Benjamin Klusemann (Leuphana University of Lüneburg)

Chaired by: Dr. Emilio Martínez-Pañeda (Imperial College London)

Enriched Model for Interfaces Exhibiting Serrated Deformation and Failure

Keynote

V. Kouznetsova*, L. Liu, F. Maresca, J. Hoefnagels, M. Geers

Phase Field Fracture Modelling of Composite Materials

W. Tan*, K. Au-Yeung, A. Quintanas Corominas, E. Martínez-Pañeda

Exploring Phase Field Fractures in 3D Printed Fibre Reinforced Composites

G. Pissas*, S. Triantafyllou

A Consistent Phase-Field Formulation for Ionic Transport and Reactions within Electrolyte-Filled Fractures

T. Hageman*, E. Martínez-Pañeda

Thu, 07/09/2023 08:45 - 10:45

A3 - 002

THm-1703c - - IS1703c - Multi-scale and Computational Scale Bridging

Organized by: Dr. Varvara Kouznetsova (Eindhoven University of Technology), Prof. Jörg Schröder (University Duisburg-Essen), Prof.

Kenjiro Terada (Tohoku University)

Chaired by: Prof. Jörg Schröder (University Duisburg-Essen)

Domain Microstructure Evolution in Ferroelectric Ceramics by a First-Principles-Informed, Thermalized Phase Field

Keynote

D. Kochmann*, R. Indergand

Particle-Based Approach to the Eulerian Distortion Field

M. Hütter*, M. Pavelka

Error-driven hierarchical modelling of composite structures

N. Feld*, M. Fergoug, A. Parret-Fréaud, B. Marchand, S. Forest

Enhanced plastic response in new Voronoi-type porous materials obtained by nonlinear elasticity

Z. Hooshmand-Ahoor*, G. Tarantino, H. Luo, K. Danas

Peristaltic-driven flows induced in piezoelectric porous structures; homogenization approach

E. Rohan*, V. Lukeš

Thu, 07/09/2023 08:45 - 10:45

A3 - 106

THm-1706a - - IS1706a - Cracks and Discontinuities in Quasi-Brittle Materials Subject to Coupled Processes, Including Durability Mechanics and Hydraulic Fracture

Organized by: Prof. Giovanna Xotta (University of Padova), Prof. Ignacio Carol (Technical University of Catalonia)

Chaired by: Dr. Ignacio Carol (UPC), Dr. Giovanna Xotta

Weak coupling between macroscopic and mesoscopic approaches to describe concrete cracking

I. Bitar*, C. Pélissou, S. Dray, F. Perales

Fracture Analysis of Brittle Materials with Residual Stress Field

S. Hirobe*, K. Oguni

A continuous Approach for Modelling Fracture Formation and its Application to Gas Fracturing of Callovo-Oxfordian Claystone

J. Rabone*, R. Rodrigues de Amorim, C. La Borderie, O. Maurel, S. Dal Pont, M. Briffaut, M. VU, R. De La Vaissière

New Results in Numerical Modelling of Two-phase Flow in Fractured Rock Masses Using Zero-thickness Interface Elements

L. Barandiarán*, J. Liaudat, C. López, D. Garolera, I. Carol

Non-local poromechanical coupling based on multi phase-fields

M. Tricoche*, P. Morenon, A. Millard, A. Sellier, A. Papon, E. Grimal, R. Tajetti, P. Kolmayer

Thu, 07/09/2023 10:45 - 11:30

A3-A4 Building Terrace

Coffee Break

Thu, 07/09/2023 11:30 - 13:30

A3 - 202

THm-1801 - - IS1801 - Advances In Modeling Soils Under Cyclic and High-Cyclic Loading

Organized by: Jan Machacek (Technische Universität Darmstadt)

Chaired by: Dr. Jan Machacek (Technische Universität Darmstadt)

Hypoplastic model for cyclic loading with inner stiffness multiplier

M. Alipour*, W. Wu

A Hypoplastic Model Considering Particle Breakage for Monotonic and Cyclic Loading of Granular Sand

H. Qian*, W. Wu, C. Xu, X. Du

Numerical Investigation of Infinite Slopes under Bi-directional Cyclic Loading

A. Csuka*, S. Chrisopoulos, R. Cudmani

Verification and Practical Use of the High Cycle Accumulation Model for Sand

P. Tantivangphaisal, D. Taborda, S. Kontoe

Challenges in the Calibration of Finite Element Models for the Analysis of Masonry Structures: A Comparative Study

A. Ghezelbash*, F. Messali, J. Rots

Thu, 07/09/2023 11:30 - 13:30

A3 - 101

THm-201 - - IS201 - Numerical Simulation of Biomimetic Materials

Organized by: Dr. Brubeck L. Freeman (Cardiff University), Prof. Iulia C. Mihai (Cardiff University), Prof. Tony D. Jefferson (Cardiff University)

Chaired by: Dr. Brubeck Freeman (Cardiff University)

Multiscale homogenization approaches for the optimization of plant-based building materials Keynote

A. Abou Chakra*, G. Huang, J. Absi, S. Geoffroy

The Application of a Coupled Finite Element Model to Simulate Healing in a Range Of Autonomic and Enhanced Autogenic Self- Healing Systems

A. Jefferson*, B. Freeman

An Unfitted Finite Element Model for Simulating Transport Processes in Vascular Self-Healing Cementitious Materials

B. Freeman*, A. Jefferson

Thu, 07/09/2023 11:30 - 13:30

A4 - 205

THm-1700a - - CT1700a - Multi-Scale Material Models and Multi-Physics Problems

Chaired by: Prof. Tadeusz Burczyński (Institute of Fundamental Technological) and Jörg Schröder (University Duisburg-Essen)

Multiscale Modeling of Concrete with Nano-Ingredients

M. Poński, I. Pokorska-Służalec, **T. Burczyński***

Modelling the Effects of Crack Sealing on the Hydromechanical Behavior of Claystone

S. Abou Chakra*, B. Bary, E. Lemarchand, S. Granet, J. Talandier

Multi-scale Analysis of Hardening Concrete Under Vibration

S. El Yassini*

A Hybrid-Mixed FEM to describe the Phenomenological Processes of Crack Formation and Fibre Pullout in UHPFRC

L. Gietz*

Phenomenological material model for failure in reinforced high performance concretes at low cycle fatigue

D. Brands*, M. Pise, G. Gebuhr, S. Anders, J. Schröder

Effect of Confining Stress on the Fracture Mode in Micromechanical Modeling of the Brazilian Splitting Tests

M. Sarem*, N. Deresse, J. Ulloa, E. Verstrynge, S. François

Thu, 07/09/2023 11:30 - 13:30

A3 - 103

THm-304a - - IS304a - Plasticity and Damage At The Microscale

Organized by: Prof. Javier Segurado (Technical University of Madrid), Prof. Jaime Marian (INEGI), Prof. Samuel Forest (Armines Mines ParisTech)

Chaired by: Prof. Javier Segurado Escudero (Universidad Politécnica de Madrid / IMDEA Materials Institute)

Modeling the development of slip localizations in crystal plasticity **Keynote**

I. Beyerlein*

Initial Yield Surface for Hcp Voided Crystals - Micromechanical Model and Numerical Validation

K. Kowalczyk-Gajewska*, S. Virupakshi, K. Frydrych, G. Vardillo

Statistics of local stresses in polycrystals

M. Krause*, F. Gehrig, D. Wicht, T. Böhlke

Analysis of Deformation Mechanisms of P91 Martensitic Steel Using Micro-pillar Tests and Crystal Plasticity Modelling

S. Isavand*, P. Sreenivasa Rao, A. Bondarev, S. B Leen, N. P O'Dowd

Dynamic Shock-Driven Dislocation Dipole Nucleations in a Peierls Model

Y. Pellegrini*, M. Josien

Thu, 07/09/2023 11:30 - 13:30

A4 - 206

THm-700f - - CT700f - Damage, Fracture, Fatigue and Failure Mechanics

Chaired by: Prof. Eduardo de Souza Neto (Swansea University)

Fatigue Behaviour of Glass-fiber-reinforced Polymers: Numerical Versus Experimental

B. Alcaide*, A. Cornejo, S. Jiménez, L. Barbu, M. Merzkirch, E. Marklund

Multiscale analysis of fracture in short glass fiber reinforced polymers through phase field

A. Fajardo Lacave*, F. Welschinger, L. De Lorenzis

Modelling of elastoplasticity and fracturing of polycrystalline metals using microplane approach

I. Mundó*, F. C. Caner, A. M. Mateo

A Computational Strategy to Enable the Constitutive Characterisation of Amorphous Polymeric Blends PC/ABS

F. Pala Beirão Macedo*, I. André Rodrigues Lopes, F. Manuel Andrade Pires

On Modelling The Loading Rate Dependency Of Salt Rock Fracturing

A. Escanellas*, J. Liaudat, I. Carol

Microscopic damage model via a multi-scale defect dynamics.

I. Ryu*

Thu, 07/09/2023 11:30 - 13:30

A3 - 104

THm-707a - - IS707a - Advances in Ductile Failure

Organized by: Prof. Alan Needleman (Texas A&M University), Prof. Ahmed Benallal (ENS Paris Saclay/CNRS), Amine Benzerga (Texas A&M University), Dr. David Morin (Norwegian University of Science and Technology)

Chaired by: Prof. A. Needleman (Texas A&M University)

Application of a Theory of Unhomogeneous Yielding to Ductile Failure Analysis

R. Vigneshwaran*, A. Benzerga

New Insights into the Role of Porous Microstructure on Dynamic Shear Localization

A. Vishnu*, M. Marvi-Mashhadi, J. Nieto-Fuentes, J. Rodríguez-Martínez

Inferring Crack Path and Crack Growth Resistance using Evolving Graphs

A. Molkeri, **A. Srivastava***

A Material Model for Nonlinear Anisotropic Viscoelastic Behavior of Plant Tissues of *Stephania japonica*

D. Macek, H. Holthusen, A. Rjosk, S. Ritzert, **S. Reese***

Anisotropic Stress State Dependent Fracture Properties of BCC Steels at Room and Cryogenic Temperatures

F. Shen*, S. Münstermann, J. Lian

Thu, 07/09/2023 11:30 - 13:30

A3 - 105

THm-700a - - CT700a - Damage, Fracture, Fatigue and Failure Mechanics

Chaired by: Prof. Dr. Lucia Barbu (CIMNE/UPC)

Deep learning phase-field model for brittle fractures

J. Ghaffari Motlagh*, P. Jimack, R. de Borst

Phase Field Modeling of Corrosion-Induced Cracking in Reinforced Concrete Structures

J. Abou Eid*

Modeling Fatigue Fracture with Phase Field, Adaptive Mesh Refinement and Cycle Jumps

A. Jaccon*, B. Prabel, G. Molnár, J. Bluthé, A. Gravouil

On the use of a fourth-order degradation tensor for fracture phase-field models

C. Esteves*, J. Boldrini, M. Bittencourt

Assessment of phase-field fracture and crystal plasticity simulations of polycrystals

J. Scherer*, M. Ramesh, S. Gorske, A. Marboeuf, B. Bourdin, K. Faber, P. Voorhees, K. Bhatthacharya

Thu, 07/09/2023 11:30 - 13:30

A3 - 201

THm-CT1100+1200 - - High Performance Computing + CT1200 - Industrial Applications in Science and Engineering

Chaired by: Prof. Orlando Soto (Applied Simulations Inc.) and Dr. Ali Mezher (CEA Saclay)

Application of the Adaptive Static Condensation Method on the Vercors Mock-Up

A. Mezher*, L. Jason, G. Folzan, L. Davenne

Computational Strategy for Data-Driven Nonlinear FEA with Hardware Acceleration

H. Chung*, H. Kwak

Finite Element Simulation of Projectile Shrinking

T. Collas*, F. Lebon, I. Rosu, C. Ningre

Numerical Modeling of Blast Loaded Concrete Buildings Using Massively-Parallel Coupled CFD-CSD Techniques

O. Soto*, M. Giltrud, J. Baum, R. Lohner, F. Togashi

Study on interface morphology and mechanical mechanism of copper-aluminum composite rolling

S. Tang*, B. Gao, G. Zhang

Domain decomposition methods for the phase field fracture staggered solver

C. Bovet*, J. Rannou

Thu, 07/09/2023 11:30 - 13:30

A3 - 205

THm-601 - - IS601 - Contact Mechanics : Modeling and Computation

Organized by: Prof. Michel Raous (Laboratoire de Mécanique et d'Acoustique), Prof. Peter Wriggers (Leibniz University of Hannover), Dr. Michael Puso (Lawrence Livermore Nat'l Lab), Prof. Giorgio Zavarise (Politecnico di Torino)
Chaired by: Prof. Michel Raous (Laboratoire de Mécanique et d'Acoustique), Dr. Michael Puso (Lawrence Livermore Nat'l Lab)

A discrete energy consistent, momentum conserving approach for implicit dynamic contact with displacement and velocity constraints

Keynote

M. Puso*

A Reverse Constrained Preconditioner for the Lagrange Multipliers Method in Contact Mechanics

A. Franceschini*, M. Frigo, C. Janna, M. Ferronato

Massively Parallel Hybrid Domain Decomposition Algorithm for Solving Huge Contact Problems

Z. Dostal*, T. Brzobohaty, D. Horak

Reduced Interface Models for Haptic Contact With Flexible Systems

S. Arbatani*, J. Kovacs

Thu, 07/09/2023 11:30 - 13:30

A3 - 102

THm-1004d - - IS1004d - Complas in Geomechanics

Organized by: Prof. Ronaldo I. Borja (Stanford University), Prof. WaiChing Sun (Columbia University), Prof. Wei Wu (University of Natural Resources and Life Sciences)

Chaired by: Prof. Ronaldo Borja (Stanford University)

FVM-based phase-field model for brittle fracture with adaptive mesh refinement

N. Guo*, X. Yang, Z. Yang

Anisotropic Bounding Surface Model for Clay Under Monotonic and Cyclic Loading Conditions

Z. Yang*, Y. Yu

Treating Bedding Planes with Distinction: Laminated Rocks Are beyond just Anisotropic Continua

Y. Zhao*

Anisotropic poromechanics of gas flow in sedimentary rocks

Q. Zhang*, Z. Yin

Drained Instability of Granular Soils from Microscopic Perspectives

J. Yang, L. Zhang*

Numerical Investigation of Cyclic Energy Piles Considering Thermo-Plasticity of Soil

S. Zhang*, X. Zhao, Q. Zhang, C. Ng

Thu, 07/09/2023 11:30 - 13:30

A3 - 203

THm-1400c - - CT1400c - Manufacturing and Material Forming Processes

Chaired by: Sr. Carlos Moreira (CIMNE/UPC) and Mr. Juan Manuel Martínez (ArcelorMittal Global R&D)

Thermal analysis of 3D printing processes in the reference frame of the moving heat source

M. Slimani*, M. Cervera, M. Chiumenti

A scalable thermo-mechanical framework for the part-scale analysis in metal additive manufacturing processes

C. Moreira*, M. Caicedo, M. Cervera, M. Chiumenti, J. Baiges

Thermo-mechanical simulation of annealing heat treatment in laser powder bed fusion additive manufacturing

X. Lu*, M. Chiumenti, M. Cervera

Numerical Analysis Of Wire Laser Additive Manufacturing For Low Carbon Steels

J. Martínez Alvarez*, M. Chiumenti

Performance Analysis of Additively Manufactured Polymeric Auxetic Structures

S. Farshbaf*, N. Dialami, M. Cervera

Thu, 07/09/2023 11:30 - 13:30

A3 - 001

THm-1701f - - IS1701f - Non-local Models for Plasticity, Fracture and Interfacial Problems

Organized by: Dr. Emilio Martínez-Pañeda (Imperial College London), Prof. Christian Niordson (Technical University of Denmark), Prof. Benjamin Klusemann (Leuphana University of Lüneburg)

Chaired by: Dr. Emilio Martínez-Pañeda (Imperial College London)

Understanding Microstructures and their Properties with Data Mining and Machine Learning-based Predictions

Keynote

S. Sandfeld*

Phase-field modeling of localized corrosion in polycrystalline materials

M. Makuch, S. Kovacevic*, M. Wenman, E. Martínez-Pañeda

A Phase-Field-Based Chemo-Mechanical Model for Corrosion-Induced Cracking In Reinforced Concrete

E. Korec*, M. Jirasek, H. S. Wong, E. Martínez-Pañeda

Modelling of Running Ductile Fracture by Coupling the Phase-Field Evolution with a Local Damage Model

A. Sur*, O. Hopperstad, D. Morin, G. Gruben

Modelling of Piezoresistive Fracture in Carbon Nanotube-Based Composites

L. Quinteros*, E. Martínez-Pañeda, E. García-Macías

Thu, 07/09/2023 11:30 - 13:30

A3 - 002

THm-1703d - - IS1703d - Multi-scale and Computational Scale Bridging

Organized by: Dr. Varvara Kouznetsova (Eindhoven University of Technology), Prof. Jörg Schröder (University Duisburg-Essen), Prof. Kenjiro Terada (Tohoku University)

Chaired by: Dr. Mayu Muramatsu (Keio University)

Novel Architectures of Deep Neural Networks for Universal Predictions of Elasticity Tensors in Homogenization

Keynote

B. Eidel*

Adaptive techniques for MOR of unitcells in non-linear FE simulations

Y. Özmen*, R. Niekamp, P. Nigro, J. Schröder

Efficient Two-Scale Simulations of Geometrically Parameterized Elasto-Plastic Microstructures

T. Guo*, O. Rokos, K. Veroy

Investigation on Optimal Microstructure of Dual Phase Steel with High Strength and Ductility by Machine Learning

M. Suzuki*, K. Shizawa, M. Muramatsu

A k-means Clustering FE2 Method Based on Unsupervised Machine Learning for Nonlinear Multiscale Calculations

S. Chaouch*, J. Yvonnet

Thu, 07/09/2023 11:30 - 13:30

A3 - 106

THm-1706b - - IS1706b - Cracks and Discontinuities in Quasi-Brittle Materials Subject to Coupled Processes, Including Durability Mechanics and Hydraulic Fracture

Organized by: Prof. Giovanna Xotta (University of Padova), Prof. Ignacio Carol (Technical University of Catalonia)

A Numerical Model for Frictional Contact Mechanics in Hydraulic Fracturing Applications

M. Ferronato*, A. Franceschini, L. Gazzola

HPC of concrete specimens subject to External Sulfate Attack at the meso-level using interface elements

C. Biscaro*, C. López, G. Xotta, I. Carol

Numerical Modelling of Limited Entry Technique: Application to Hydraulic Fracture Completion Design.

A. Perez*, J. Alvarelos, D. Garolera, I. Carol

Thu, 07/09/2023 13:30 - 14:30

A3-A4 Building Terrace

Lunch Break

Thu, 07/09/2023 14:30 - 16:30

Vèrtex Building - Auditorium

THa-PL5 - - Plenary Session V

Chaired by: Prof. Eduardo de Souza Neto

Phase field for compaction band formation: Capture of grain crushing and permeability evolution in heterogeneous media

R. Borja*

Automated model discovery – A new paradigm in computational mechanics?

E. Kuhl*

Advances In Particle Finite Element Method For The Simulation Of Phase Change Problems And Fluid-Structure Interactions

J. Ponthot*

Thu, 07/09/2023 16:30 - 17:00

A3-A4 Building Terrace

Coffee Break

Thu, 07/09/2023 17:00 - 19:00

A3 - 202

TUa-102a - - IS102a - Virtual Element Method For Engineering Applications

Organized by: Prof. Fadi Aldakheel (Leibniz Universität Hannover), Prof. Edoardo Artioli (Università degli Studi di Roma Tor Vergata), Mr.

Lourenço Beirão Da Veiga (Università di Milano-Bicocca), Prof. Peter Wriggers (Leibniz University of Hannover)

Chaired by: Prof. Edoardo Artioli (University of Rome "Tor Vergata"), Mr. Lourenco Beirao da Veiga (Università di Milano-Bicocca)

Virtual Elements for Phase Field Modeling of Fracture in Plates **Keynote**

F. Aldakheel*, B. Hudobivnik, J. Korelc, P. Wriggers

A C1 -Conforming Arbitrary-Order Two-Dimensional Virtual Element Method for the Fourth-Order Phase-field Equation

G. Manzini*, D. Adak, H. Mourad, J. Plohr, L. Svolos

A boundary virtual element method for solving electromagnetic scattering problems in the frequency domain

A. Touzalin*, E. Arcese, S. Pernet

Virtual elements for the treatment of three dimensional contact

M. Cihan*, B. Hudobivnik, P. Wriggers

Thu, 07/09/2023 17:00 - 19:00

A3 - 101

THa-200a - - CT200a - Advanced Material Models and Computational Material Design

Chaired by: Prof. Sergio Oller (CIMNE/UPC)

A Numerical Framework For Modelling Tire Mechanics Accounting For Composite Materials, Large Strains And Frictional Contact

A. Cornejo*, L. Barbu, P. Wriggers, S. Oller, E. Oñate

Multiresonant Layered Acoustic Metamaterials (MLAM): Computational Design and Optimization

G. Sal Anglada*, D. Yago Llamas, J. Cante Teran, J. Oliver Olivella, D. Roca Cazoria

A Universal Yield Surface for Metamaterials

N. Baghous*, I. Barsoum, R. Abu Al-Rub

Modeling the influence of temperature and moisture on the elasto-plastic behavior of paper and paperboard

N. Kopic-Osmanovic*, H. Schubert, S. Rief, J. Orlik, H. Andrä, M. Hauptmann, J. Simon

Finite element analysis on subsequent yield surfaces of cellular composites

L. Liu*, H. Chen

Thu, 07/09/2023 17:00 - 19:00

A4 - 205

THa-1700b - - CT1700b - Multi-Scale Material Models and Multi-Physics Problems

Chaired by: Mr. Houdich (Eidgenössische Technische Hochschule) and Dr. Bostanabad (UCI)

Physically Meaningful Samples in Randomized Local Model Order Reduction

P. Diercks*, A. Robens-Radermacher, K. Veroy, J. Unger

Multiscale Damage via Physics-Informed Recurrent Neural Networks

S. Deng, S. Hosseinmardi, **R. Bostanabad***

A Multi Time Stepping Algorithm for the Modelling of Heterogeneous Structures with Explicit Time Integration

K. Chan*, N. Bombace, D. Sap, K. Bronik, N. Petrinic

Sources of Uncertainty in Crystal Plasticity

G. Castelluccio*

Coupling Mechanics with Spinodal Decomposition Phenomena

H. Oudich*, P. Carrara, L. De Lorenzis

Co-Design of variational formulations of a coupled deformation-diffusion problem and the parallel FROSch solver

S. Prüger*, F. Röver, B. Kiefer, O. Rheinbach

Thu, 07/09/2023 17:00 - 19:00

A3 - 103

THa-304b - - IS304b - Plasticity and Damage At The Microscale

Organized by: Prof. Javier Segurado (Technical University of Madrid), Prof. Jaime Marian (INEGI), Prof. Samuel Forest (Armines Mines ParisTech)

Chaired by: Prof. Samuel Forest (Armines Mines ParisTech)

Role of Grain Boundary Stress Fields and their Evolution on Dislocation Transmission via Discrete Dislocation Dynamics Simulations

Keynote

D. Bamney, L. Capolungo, D. Spearot*

Validation of Mesoscale Field Dislocation Mechanics: micropillar confined thin-film plasticity and kink-banding in nanolaminates at finite deformation

A. Arora*, R. Arora, A. Acharya

Investigation of Grain Boundary Properties at Finite Temperature via Upscaling with the Gaussian Phase Packets Formulation

M. Spinola*, S. Saxena, D. Kochmann, P. Gupta

Predicting and designing the thermo-elasto-plastic response of composites using deep material network

R. Dingreville*, D. Shin, R. Alberdi, R. Lebensohn

On the comparison between monolithic and staggered solvers in a FFT-based framework for Phase-Field fracture.

P. Aranda*, J. Segurado

Thu, 07/09/2023 17:00 - 19:00

A4 - 206

THa-700g - - CT700g - Damage, Fracture, Fatigue and Failure Mechanics

Chaired by: Dr. Stefan Kollmannsberger (Technische Universität München)

Ductile Fracture Simulation using Gurson-Cohesive Model (GCM) in 3D

J. Park*, S. Kweon, K. Park

Mechanical Behavior of Porous Ductile Materials Under Dynamic Loading: Interaction of Voids

M. El Ansi*, C. Sartori, C. Czarota

Ductile Fracture Simulations using XFEM and an Instability-based Crack Initiation Criterion

S. Rajeev*, S. Keralavarma

Viscoplastic cohesive zone model dedicated to overfragmentation of pressurized nuclear ceramics at high temperature

C. Tosi*, R. Largenton, Y. Monerie, P. Vincent

On the transition from diffusive to discrete crack topologies in crack phase-field model

J. Han*, Y. Shintaku, S. Moriguchi, K. Terada

A Plastic-Damage-Cracking Model for Tensorial Crack Opening

A. Daneshyar*, L. Herrmann, O. Oztoprak, L. Hug, S. Kollmannsberger

Thu, 07/09/2023 17:00 - 19:00

A3 - 104

THa-707b - - IS707b - Advances in Ductile Failure

Organized by: Prof. Alan Needleman (Texas A&M University), Prof. Ahmed Benallal (ENS Paris Saclay/CNRS), Amine Benzerga (Texas A&M University), Dr. David Morin (Norwegian University of Science and Technology)

Chaired by: Prof. Ahmed Benallal (ENS Paris Saclay/CNRS)

Numerical Modelling of Ductile Fracture Involving Two Length Scales **Keynote**

J. Faleskog*, S. Wang

A Numerical Model to Study Effects of Void Size Distribution on Ductile Failure

L. Dæhli*, D. Morin, J. Faleskog, O. Hopperstad

Void growth in ductile materials with actual porous microstructures

A. Vishnu*, G. Vadillo, J. Rodriguez-Martnez

The effect of phase continuity and plastic anisotropy on the onset and evolution of adiabatic shear band

S. Osovski*

A Shear Modified Enhanced Gurson Constitutive Relation with Implications for Localization

I. Khan*, A. Benzerga, A. Needleman

Thu, 07/09/2023 17:00 - 19:00

A3 - 105

THa-800 - - CT800 - Data Driven Modeling in Science and Engineering

Chaired by: Mr. Eugenio José Muttio Zavala (Swansea University) and Ms. Reem Alhayki (Swansea University)

Computational Homogenization of Arbitrary Heterogeneous Mesostructures with Inelastic Constitutive Behavior using Machine Learning Methods

J. Stöcker*, E. Elsayed, F. Aldakheel, M. Kaliske

Graph-based Representation of Elastoplastic Material Response in the Data-driven Framework

H. Dandin*, A. Leygue, L. Stainier

A Neural Network Based Strategy for the Modelling of Constitutive Behaviour of Solids Applied to Porous Elasto-Plastic Material

R. Alhayki*, E. Muttio, W. Dettmer, D. Perić

Automated, machine learning based surface crack detection in fracture experiments

N. Karathanasopoulos*, P. Hadjidakas, D. Mohr

A Neural Network Based Surrogate Model for Inelastic Solid Materials Simulations

E. Muttio Zavala*, R. Alhayki, W. Dettmer, D. Perić

Machine Learning and Data Mining of Dislocation Simulations

A. Demirci*, S. Sandfeld

Thu, 07/09/2023 17:00 - 19:00

A3 - 205

THa-600 - - CT600 - Contact Mechanics

Chaired by: Dr. Mike Puso (Lawrence Livermore Nat'l Lab)

Wireframe Modeling of Overhead Conductors for Life Time Prediction

K. Ait Ammar*, P. Guidault, P. Boucard, J. Said, F. Hafid

Use of Neural Networks to Classify the Conformity of Wheel-Rail Contact Based on Families of Profiles

M. Moreira Lopes*, V. Alves de Lima, I. Machado, R. Martins Souza, N. Kiyoshi Fukumasu, F. Profitto, L. Driemeier

Overview of Coupled Hydro-mechanical Interfaces in Numerical Modelling of Uplifting

S. Mei, M. Peng, **Y. Tian***, M. Cassidy

Development of a simplified model for the transient dynamic analysis of bolted assemblies

Q. Lançon*, P. Guidault, P. Boucard, N. Vallino

A Variationally Consistent Contact Formulation Based on Mixed Interpolation Method and Isogeometric Discretization

T. Duong*, J. Kiendl, L. Leonetti

An Unbiased Surface-to-Surface Frictional Contact Algorithm for Higher Order Finite Elements

I. Sahu*, N. Petrinic

Thu, 07/09/2023 17:00 - 19:00

A3 - 102

THa-1000 - - CT1000 - Geomechanics, Environment and Geoscience

Chaired by: Prof. Ignacio Carol (UPC)

A Dynamic ALE Framework for Structures with Inelastic Material Properties Under Moving Loads

A. Anantheswar*, I. Wollny, M. Kaliske

Hydro-mechanical simulation of bentonite-based materials in a large-scale oedometer

C. Rodriguez*, R. Vasconcelos, A. Gens, J. Vaunat, M. Villar

A data-driven framework for breakage mechanics in granular media

J. Ulloa*, A. Gorgogianni, K. Karapiperis, M. Ortiz, J. Andrade

Extension to H/S of the M-AGC tangent operator and Visco-Plastic Relaxation strategies using zero-thickness interface elements

I. Jaqués*, I. Carol

Thu, 07/09/2023 17:00 - 19:00

A3 - 203

THa-1400d - - CT1400d - Manufacturing and Material Forming Processes

Chaired by: Prof. Mirna Poggi (Politecnico di Torino) and Prof. Jerzy Rojek (Institute of Fundamental Technologica) and

Numerical Simulation for Repair Process by Laser Cladding of SUS316L on SUS304 Substrate

T. Izumi*, M. Arai

Predictive Capability of 3DEXperience (3DX) in Assessing Deformation Induced by Different Scanning Strategies in Laser Powder Directed Energy Deposition (LP-DED) Process

M. Poggi*, E. Atzeni, L. Luliano, A. Salmi, M. Vallone, M. Damasio

Pharmaceutical Powder Compaction Analysis by the Drucker-Prager/Cap Model with Density Related Mechanical Behaviour

S. Ishikawa*, D. Mizunaga

Discrete Element Modelling of Multiphysics Phenomena in Powder Sintering Processes

J. Rojek, **F. Nisar***, S. Nosewicz, M. Chmielewski, K. Kaszyca

A Coupled FEM-FCM Approach for the Stress Analysis of Porous Die Castings

U. Gabbert*, S. Ringwelski, M. Würkner, M. Kittsteiner

Thu, 07/09/2023 17:00 - 19:00

A3 - 001

THa-1708 - - IS1708 - Multiscale Modeling of Concrete and Concrete Structures

Organized by: Prof. Herbert Mang (Vienna University of Technology), Prof. Yong Yuan (Tongji University), Prof. Bernhard Pichler (TU Wien)

Chaired by: Prof. Herbert Mang (Vienna University of Technology), Prof. Bernhard Pichler (TU Wien)

Investigation on Bending Mechanism of Longitudinal Joints Based on Analytical Solution of a Flat Rectangular Plate

Z. liu*, X. liu, A. Alsahly, G. Meschke

Tunnel Construction Simulation Based on Shell-contact Model

Y. Gap*, X. LIU

Mesoscale Modeling of High-performance Fiber-reinforced Concrete Under Monotonic and Cyclic Loading

K. Daadouch*, V. Gudžulić, G. Meschke

Fire-induced tensile core cracking of compressed columns of a closed-frame reinforced concrete structure

M. Sorgner*, R. Diaz Flores, H. Wang, C. Hellmich, B. Pichler

Thu, 07/09/2023 17:00 - 19:00

A3 - 002

THa-1703e - - IS1703e - Multi-scale and Computational Scale Bridging

Organized by: Dr. Varvara Kouznetsova (Eindhoven University of Technology), Prof. Jörg Schröder (University Duisburg-Essen), Prof.

Kenjiro Terada (Tohoku University)

Chaired by: Dr. Varvara Kouznetsova (Eindhoven University of Technology)

Multiscale Finite Element Methods for heterogeneous plates

F. Legoll*, V. Ehrlacher, A. Lebee, A. Lesage

Wang tiles for modeling and simulating random heterogeneous materials

M. Doškář, J. Novák, **J. Zeman***

Two-scale Analysis of Elastoplastic Material by Means of RBF-Based Surrogate Model

Y. Yamanaka*, S. Matsubara, N. Hirayama, S. Moriguchi, K. TERADA

Computational Homogenization With Improved Minimal Kinematical Condition For Nonperiodic Microstructures

A. Nakamura*, Y. Yamanaka, Y. Shintaku, S. Moriguchi, K. Terada

Multiscale Modeling of Laminated Thin-shell Structures with Direct FE2

J. Zhi, K. Leong, K. Yeoh, T. Tay, **V. Tan***

Multi-Scale Modelling of Sandwich Structures with Direct FE2 Beam Elements

K. Yeoh*, L. Poh, T. Tay, V. Tan

THa-1707 - - IS1707 - Computational Approaches for Heterogeneous Materials

Organized by: Prof. Frederic Legoll (ENPC), Prof. Jan Zeman (Czech Technical University in Prague)

Chaired by: Prof. Frederic Legoll (ENPC), Prof. Jan Zeman (Faculty of Civil Engineering, Czech Technical University in Prague)

An FFT method for implicit dynamics in heterogeneous media: application to polycrystals

Keynote

R. Sanchi, R. Lebensohn, **J. Segurado***

FFT-accelerated Discrete Green's Operator Preconditioned Finite Element Solver for Periodic Homogenization

M. Ladecký*, R. Leute, A. Falsafi, I. Pultarová, L. Pastewka, T. Junge, J. Zeman

Architected Materials Meet Domain Decomposition

P. Antolin*, T. Hirschler, A. Buffa

A multi-scale model to predict the time-dependent degradation of cellulose fibrous networks

E. Bosco*, A. Parsa Sadr, A. Suiker

Multiscale modeling of masonry through a numerical yield design homogenization method

E. Donval*, D. Pham, G. Hassen, P. de Buhan, M. Vigroux