Coupled 2023
Technical Programme

Sunday, 04/06/2023

Sun, 04/06/2023 18:00 - 20:00 — Minoa Palace Resort Hotel
Pre-registration

Sun, 04/06/2023 20:00 - 21:00 — Minoa Palace Resort Hotel
Welcome Reception

Monday, 05/06/2023

Mon, 05/06/2023 08:00 - 09:00 — Minoa Palace Resort Hotel
Registration

Mon, 05/06/2023 09:00 - 09:10 — Imperial - Main
Opening ceremony

Mon, 05/06/2023 09:10 - 10:40 — Imperial - Main
Plenary Lecture I - P. Wriggers and S. Reese
Chaired by: Prof. Sergio Idelsohn (CIMNE)

Multi-physical Modeling of Soft Tissue-Stent Interaction
S. Reese*

A coupled model for the formation of Atherosclerosis due to inflammation processes
P. Wriggers*, M. Gierig, A. Haverich

Mon, 05/06/2023 10:40 - 11:10 — Minoa Palace Resort Hotel
Coffee Break

Mon, 05/06/2023 11:10 - 13:10 — Imperial - Main
IS06 - I - - Computational Models and Methods for Multiphysics Processes in Multiphase Porous Media - in Honour of the 80th Birthday of Professor Schrefler
Chaired by: Prof. Lorenzo Sanavia (University of Padova)

Numerical modeling of concrete structures durability by means of Multiphase Porous Media Mechanics Keynote
F. Pesavento*, D. Gawin

A Hydration-Based Multiphysics Model for Cementitious Materials: Application to 3D Printing Process Simulation
M. Pierre*, S. Ghabezloo, P. Dangla, M. Vandamme, R. Mesnil, J. Caron

Gradient-enhanced micropolar damage-plasticity modeling of localized failure: Framework and computational aspects
P. Gamnitzer*, M. Neuner, N. Alkmim, G. Hofstetter

Coupled models for the simulation of water hazards and their interaction with structures and protection systems
A. Larese*, L. Moreno, V. Singer, K. Sautter, R. Wuechner

Modelling thawing-triggered landslides using a multi-physics SPH framework
Y. Lian, **H. Bui***

Mon, 05/06/2023 11:10 - 13:10 — Athina - Athina I
IS21 - I - - Recent trends in model order reduction for coupled problems
Chaired by: Dr. Giovanni Stabile (University of Urbino Carlo Bo)

Physics-informed neural network and reduced order modeling in the context of variational multiscale method Keynote
S. Dave, **A. Korobenko***

Model Order Reduction for FSI problems: POD-based partitioned and monolithic approaches
M. Nonino*, F. Ballarin, G. Rozza

POD-based reduction of varying boundary control on optimal control problems
M. Strazzullo*, F. Vicini

Implicit Schur complement iterative modal solvers for multiphysics model order reduction
G. Buron*, F. Thouverez, L. Jézéquel, A. Beley, F. Thévenon

Mon, 05/06/2023 11:10 - 13:10 — Imperial - Hall I
IS33 - I - - Progress in Computational Multiphysics Using Open-source Software
Chaired by: Prof. Holger Marschall (TU Darmstadt)

An overview of coupling methods in the code_saturne CFD solver Keynote
Y. Fournier*

A Unified Multiphysics Framework for Multi-Region Coupling
H. Alkafri, C. Habes, M. Fadeli, H. Jasak, **H. Marschall***

The Community-Driven preCICE Ecosystem
B. Uekermann*

Introducing a cloud-based framework for creating, visualising, testing and automating complex simulation workflows
O. Stodieck*

Mon, 05/06/2023 11:10 - 13:10 — Imperial - Hall II

IS01 - I - - Advanced computational approaches for solving coupled problems in geomechanics

Chaired by: Prof. HA H. BUI (Monash University)

Resolved/unresolved coupled CFD-DEM for simulation of particle-fluid-structure interaction problems **Keynote**
J. Zhao*, T. Yu, Z. Lai, S. Zhao

A hybrid MPM-CFD model for simulating multiphase flow in deformable porous media
Q. Tran*

Fast semi-analytic sequential explicit coupling analysis of 3D planar hydraulic fracturing
L. PAULLO MUNOZ*, D. Roehl, C. Mejia, J. Rueda

A nodal integration-based particle finite element method for poro-elastoplastic modelling of saturated soils using mathematical programming
L. Wang*, X. Zhang, X. Geng, Q. Lei

Fractures as Interface Conditions for Biot's equations in the Frequency-space Domain
M. Favino*

Mon, 05/06/2023 11:10 - 13:10 — Imperial - Hall III

IS23 - I - - Computational modeling for hydrogen technologies

Chaired by: Dr. Tim Hageman (Imperial College London)

FFT-based phase-field modelling for microstructurally short cracks **Keynote**
S. Lucarini*, F. Dunne, E. Martínez-Pañeda

A chemo-mechanically coupled theory including elasto-plastic deformations for Finite-Element simulations
J. Gisy*, A. Dyck, T. Böhlke

Multiphase-field Approach to Hydrogen Embrittlement in Polycrystalline Materials
H. Jafarzadeh*, O. Shchyglo, I. Steinbach

Another heat-transfer analogy for modeling chemo-mechanically coupled hydrogen diffusion processes in metals
A. Dyck*, J. Gisy, L. Groß, T. Böhlke

Modelling Electrolyte-Metal Interactions using the Fracture Phase-field Framework for Predicting Hydrogen Embrittlement
T. Hageman*, E. Martínez-Pañeda

Mon, 05/06/2023 11:10 - 13:10 — Imperial - Hall IV

IS10 - I - - Coupled Thermo-mechanical Modeling of Large Deformation Processes

Chaired by: Prof. Jean Philippe Ponthot (University of Liège)

Stress-accurate FE framework for the numerical simulation of the FSW process **Keynote**
M. Chiumenti*, H. Venghaus, J. Baiges, N. Dialami, M. Cervera, D. Juhre

Thermo-mechanical coupling topology optimization of leading edge structures considering GH4099 additive manufacturing constraints
H. Liu*, S. Zhu, J. Li, J. Lv

Hot compression bonding of AA6061: A computational study of interface conditions and their relation to bond strength
M. Kayat*, B. Mittelman, M. Ben-Haroush, I. Aloush, L. Mordechay, J. Bortman, E. Priel

A thermomechanically fully coupled finite strain shape memory alloy model applied to bistable microactuators
S. Wulfinghoff*, M. Hörsting

Mon, 05/06/2023 11:10 - 13:10 — Athina - Athina II

IS20 - I - - Complexity reduction of large-scale parametric problems: domain decomposition, reduced order models and machine learning

Chaired by: Dr. Matteo Giacomini (CIMNE - Universitat Politècnica de Catalunya, Barcelona)

Validation of the ICDD method to model the filtration of fluid in porous media **Keynote**
P. Gervasio*, M. Discacciati

Modelling of Non-Linear Contact Resistance in a Finite Element Framework
S. Blakseth*, A. Massing

A Coupled Radiation-Fluid Flow Model for the Prediction of Inactivation Pathogens in air and water using UVC
A. Buchan*, L. Yang, K. Atkinson, D. Welch

Mon, 05/06/2023 11:10 - 13:10 — Athina - Athina III

IS16 - I - - Nonlinear and deep learning based model reduction for coupled problems

Chaired by: Prof. Karsten Urban (Universität Ulm)

Nonlinear and Deep-learning based ROMs for coupled CFD with fast transient dynamics **Keynote**
G. Rozza*, M. Cracco, G. Stabile

Non-intrusive reduced order modeling for a coupled electro-thermo-mechanical problem
L. Schuler*, L. Chamoin, Z. Khatir, M. Berkani, M. Ouhab

Learning Nonlinear Hamiltonain Systems in a Suitable Quadratic Embeddings
S. Yildiz*, P. Goyal, T. Bendokat, P. Benner

A Certified Adaptive Surrogate Hierarchy for Parametrized PDEs
B. Haasdonk, H. Kleikamp, M. Ohlberger, **F. Schindler***, T. Wenzel

Space-time Variational Methods for Control Constrained Parabolic Optimal Control Problems
M. Reinhold*, N. Beranek, K. Urban

Mon, 05/06/2023 11:10 - 13:10 Athina - Ariadne

IS07 - Coupled problems in building materials: from constitutive laws to multiphysics

Chaired by: Prof. Jaroslav Kruis (Czech Technical University in Prague)

Chemo-mechanical modelling of biogenic sulfide corrosion of concrete
E. Bosco*, F. Rooyackers, R. Luimes, A. Suiker, F. Clemens

Micro-to-macro mechanical modeling of corrosion-induced cracking
D. Kammer*, M. Pundir, U. Angst

Coupled thermal-metallurgical model of high pressure gas quenching of Pyrowear 53 ring gears
K. Bzowski*, Ł. Rauch, M. Pietrzyk, J. Łazarski

A One-Way Coupled Model for Unsaturated Soils that Captures the Change in Water Content Due to Volumetric Strains
M. Eyüpgiller*, M. Ülker

On the thermoelasticity in two-phase hollow cylinder with radially graded material properties
P. Ostrowski*

Efficient Implementation of Lattice Discrete Particle Models for Quasi-brittle and Polymer Materials
J. Kruis*, J. Vorel, T. Koudelka

Mon, 05/06/2023 13:10 - 14:30 Minoa Palace Resort Hotel

Lunch Break

Mon, 05/06/2023 14:30 - 16:30 Imperial - Main

IS06 - II - - Computational Models and Methods for Multiphysics Processes in Multiphase Porous Media - in Honour of the 80th Birthday of Professor Schrefler

Chaired by: Prof. Andrew Chan (University of Tasmania)

How physics-informed neural networks can leverage our understanding of conventional geotechnical and structural engineering problems?
M. Vahab*, N. Khalili

Mechanics and Physics of Meniscus Instability due to Drying of Granular Media
R. Chen*, B. Mielniczuk, A. Guevel, M. Veveakis, T. Hueckel

On the Role of Capillary Energy in Inducing Damage and Possibility of Fractures in Partially Saturated Porous Media
S. Ommi*, G. Sciarra, P. Nardinochhi

Variationally Consistent Phase-field Models for Desiccation Cracking
R. Bharali*, F. Larsson, R. Jänicke, F. Paul van der Meer

Phase-field modelling of drying induced cracks in initially water saturated porous media
C. Luo, **L. Sanavia***, L. De Lorenzis

Thermo-hydrodynamic Crack Propagation in Porous Media
R. al Khoury*, M. Arzanfudi

Mon, 05/06/2023 14:30 - 16:30 Athina - Athina I

IS21 -II - - Recent trends in model order reduction for coupled problems

Chaired by: Prof. Gianluigi Rozza (SISSA)

Model-based Co-simulation of Non-smooth Systems using Reduced Models
A. Raoofian*, X. Dai, J. Kovecses

Efficient and accurate reduced order modelling for cardiovascular applications
M. Girfoglio*, P. Siena, C. Balzotti, A. Quaini, G. Rozza

a Data Driven Reduced Order Model for Multiphysics Simulations of a Household Refrigerator
A. Hajisharifi*, R. Halder, M. Girfoglio, G. Stabile, G. Rozza

Mon, 05/06/2023 14:30 - 16:30 Imperial - Hall I

IS33 - II - - Progress in Computational Multiphysics Using Open-source Software

Chaired by: Prof. Holger Marschall (TU Darmstadt)

High-Order Adaptive Coupling for Multiphysics Simulations with Application to Conjugate Heat Transfer Problems
L. FRANCOIS*, M. MASSOT

Advanced Study of the Design of Auxetic Piezoelectric Structures using Structural Optimization
G. Stankiewicz*, C. Dev, P. Steinmann

Structural Topology and Shape Optimization of Electro-Active Polymers Immersed in Free Space
C. Dev*, G. Stankiewicz, P. Steinmann

Application of Load-Balanced Adaptive Mesh Refinement to Hydrogen Combustion
M. Fadeli*, T. Karpowski, D. Kaddar, F. Ferraro, H. Marschall, C. Hasse

Multi-model Investigation of the In-cylinder Direct-injection Engine Phenomena using Open-source Code
A. Pati*, C. Hasse

Mon, 05/06/2023 14:30 - 16:30 Imperial - Hall II

IS01 - II - - Advanced computational approaches for solving coupled problems in geomechanics

Chaired by: Prof. Jidong Zhao (Hong Kong University of Science and Technology, Hong Kong)

Finit Element Simulation of Calcite Precipitation in Soils
V. S. Terra*, F. M.F. Simões, R. Cardoso.

Numerical modelling of rotational frictional sliding induced damage on rock
T. Saksala*

Fluid inertia, turbulance, and rate effects in hydraulic fractures
R. Gracie*, B. Gee, N. Betancourt Irusta

Thaw-induced large deformation in granular media: a hierarchical multiscale perspective
S. Zhao*, H. Chen, J. Zhao

Fully coupled thermo-hydro-mechanical model for fracture propagation in leak-off dominated regimes
J. Rueda*, C. Mejia, D. Roehl, P. Firme

Mon, 05/06/2023 14:30 - 16:30 — Imperial - Hall III

IS23 - II - - Computational modeling for hydrogen technologies

Chaired by: Dr. Tim Hageman (Imperial College London)

Continuous Galerkin Formulation For The Simulation Of Multiphysics Processes In Planar Solid-oxide Fuel Cells (SOFC)
A. Costa-Solé*, A. Gargallo-Peiró, D. Mira, M. Torrell, A. Tarancón

Multiscale approach to simulate multiphysics in Solid Oxide Cell (SOC) electrodes
Á. Rodríguez Cambra*, M. García Camprubí, F. Gil, C. Sáenz, J. Ortún

LES study of an excited turbulent flame issuing from square and triangular nozzles
J. Stempka*, A. Tyliszczak

LES study of bluff-body stabilized hydrogen turbulent flame subjected to axial and tangential excitations
L. Caban*, A. Wawrzak, A. Tyliszczak

Buoyancy driven circulation in electrolysis cells
S. Zitz*, K. Missios, C. Hemmmingsen, K. Nielsen, J. Roenby

Mon, 05/06/2023 14:30 - 16:30 — Imperial - Hall IV

IS10 - II - - Coupled Thermo-mechanical Modeling of Large Deformation Processes

Chaired by: Prof. Jean Philippe Ponthot (University of Liège)

Thermomechanical Simulation of Blanking Process **Keynote**
J. Ponthot*, R. Boman, L. Papeleux, C. Canales

A Thermomechanically Coupled Model for Fiber-reinforced Semi-crystalline Polymers at Finite Strains: Application to Varying Degrees of Crystallinity and Temperature
M. Reuvers*, T. Brepols, S. Reese

Meshfree Modelling of Coupled Thermal-Mechanical-Chemical Phenomena in Energetic Aggregates
J. Brown*, F. Beckwith, K. Wolf, J. Clemmer

Mon, 05/06/2023 14:30 - 16:30 — Athina - Athina II

IS20 - II - - Complexity reduction of large-scale parametric problems: domain decomposition, reduced order models and machine learning

Chaired by: Dr. Marco Discacciati (Loughborough University)

Machine Learning-based Surrogate Modeling Approaches for Fixed-Wing Store Separation **Keynote**
N. Peters, **J. Ekaterinaris***

Reducing the cost of building digital twins: from domain decomposition to multifidelity models
M. Giacomini*, M. Discacciati, A. Huerta

Port-metriplectic Neural Networks for Coupled Physical Phenomena
Q. Hernandez*, A. Badias, F. Chinesta, E. Cueto

Discretized PDE-based Physics Informed Neural Network: Application in Fluid-Structure Interaction Problem
R. Halder*, G. Stabile, G. Rozza

Coupled Reduced Order Model Components for Flow Problems
V. Tsiolakis*, T. Kvamsdal, A. Rasheed, E. Fonn, H. van Brummelen

Mon, 05/06/2023 14:30 - 16:30 — Athina - Athina III

IS16 - II - - Nonlinear and deep learning based model reduction for coupled problems

Chaired by: Dr. Silke Glas (University of Twente)

Ensuring local mass conservation in reduced order models by using exact discrete complexes
W. Boon*, A. Fumagalli

A one-shot overlapping Schwartz method for component-based model order reduction of nonlinear PDEs.
T. Taddei*

Model order reduction in contour integration method for parametric linear evolution equations.
N. Guglielmi*, M. Manucci

Low-Dimensional Discovery of Port-Hamiltonian Systems by Combining Model Order Reduction and Machine Learning
J. Rettberg*, J. Kneifl, J. Fehr, B. Haasdonk

A certified wavelet-based physics-informed neural network for the solution of parameterized partial differential equations
L. Ernst*, K. Urban

Nonlinear Model Reduction for Wildland Fire Simulation
F. Black, **P. Schulze***, B. Unger

Mon, 05/06/2023 14:30 - 16:30 — Athina - Ariadne

IS09 - I - - Coupled Simulations for Additive Manufacturing

Chaired by: Prof. Ferdinando Auricchio (University of Pavia)

Numerical study of the multi-strand deposition using a boundary-conforming free-surface approach **Keynote**
F. González*, S. Elgeti, M. Behr

Phase-Field Simulations of Precipitations in additive manufacturing process of IN 625
R. Darabi*, J. Cesar de Sa, A. Reis

Application of Multi-Index Stochastic Collocation to Part-scale Thermomechanical Analysis of Laser-based Powder Bed Fusion of Metals
M. Chiappetta, C. Piazzola, **M. Carraturo***, L. Tamellini, A. Reali, F. Auricchio

A Peridynamics Framework for Selectiv Laser Melting Simulations
M. Zverlov*, M. Gee

Mon, 05/06/2023 16:30 - 17:00 — Minoa Palace Resort Hotel

Coffee Break

Mon, 05/06/2023 17:00 - 19:00 Imperial - Main

IS06 - III - - Computational Models and Methods for Multiphysics Processes in Multiphase Porous Media - in Honour of the 80th Birthday of Professor Schrefler

Chaired by: Prof. Claudio Tamagnini (University of Perugia)

Electro-chemo-mechanical couplings in structural batteries with diffusion, migration and convection in the electrolyte Keynote
K. Runesson*, D. Carlstedt, F. Larsson, V. Tu, R. Jänicke, L. Asp

Chemo-mechanical modelling of the breathing effect during lithiation and delithiation in Li-Si batteries
J. Dittmann*, J. Stern, H. Beiranvand, S. Wulfinghoff

Numerical Modelling of Nickel Electrodeposition on Polyurethane Foams
N. Ghiasi*, S. Diebels

Coupled Flow Dynamics and Mass Transfer of CO2 into Food as Porous Media
S. Esmaeilian*, A. Feyissa, A. Olsen

Multiscale, micromechanics-inspired modeling employed for quantifying the mechanobiology of bone
S. Scheiner*, C. Hellmich, T. Geroski, N. Filipovic

Mon, 05/06/2023 17:00 - 19:00 Athina - Athina I

IS21 - III - - Recent trends in model order reduction for coupled problem

Chaired by: Prof. Gianluigi Rozza (SISSA)

A Reduced Order Model for Geometrically Parameterized Two-Scale Simulations
T. Guo*, O. Rokos, K. Veroy

A Modular Reduced-Order Modeling Strategy for Coupled Multiphysics Problems
F. Wurtzer*, P. Boucard, P. Ladevèze, D. Néron

POD-based MOR of electro-chemically coupled ion transport
V. Tu*, F. Larsson, K. Runesson, R. Jänicke

Development of a methodology to generate a digital twin of a floating offshore wind turbine platform
J. García-Espinosa*

Mon, 05/06/2023 17:00 - 19:00 Imperial - Hall I

IS33 - III - - Progress in Computational Multiphysics Using Open-source Software

Chaired by: Prof. Holger Marschall (TU Darmstadt)

Transferability of Neural Network Ensemble Models between different Open-Source Codes
T. Karpowski*, F. Ferraro, E. Fortes, A. Both, D. Mira, C. Hasse

An open-source implemention of acoustic scattering problems through rigid-porous media in steady laminar flow
A. Nayak*, A. Prieto, D. Fernández-Comesaña

Magneto-Thermal Thin Shell Approximation for Open-Source Transient Analysis of Superconducting Magnets
E. Schnaubelt*, M. Wozniak, J. Dular, C. Geuzaine, N. Marsic, B. Vanderheyden, S. Schöps

DNS of emulsions in OpenFOAM - the influence of interface advection method
K. Missios*, M. Crialesi-Esposito, N. Scapin, L. Brandt, J. Roenby

Mon, 05/06/2023 17:00 - 19:00 Imperial - Hall III

IS29 - I - - Coupling image processing and computational modeling for biomedical applications

Chaired by: Dr. Cristian Linte (Rochester Institute of Technology)

A Pipeline for Generating Patient-Specific Anatomical Models of the Heart from Cine Cardiac MRI
C. Linte*

Material Decomposition Techniques and Parameter Estimation for Spectral Computed Tomography
F. Bevilacqua*, Y. Dong, J. Jørgensen, A. Lanza, M. Pragliola

Space-Time Independent Component Analysis for the extraction of information in functional imaging
C. James*

Unmasked and Masked Principles for Automatic Parameter Selection in Variational Models for Poisson Noise Corruption
A. Lanza*, F. Bevilacqua, M. Pragliola, F. Sgallari

From 4D Transesophageal Echocardiography to Patient Specific Mitral Valve Models
P. Carnahan*, T. Peters, E. Chen

Mon, 05/06/2023 17:00 - 19:00 Imperial - Hall IV

IS13 - I - - Machine learning and uncertainty quantification for coupled multi-physics, multi-scale and multi-fidelity modelling

Chaired by: Dr. Cosmin Safta (Sandia National Laboratories)

A Multi-Fidelity Ensemble Kalman Filter with Adaptive Reduced-Order Models
F. Silva*, C. Pagliantini, K. Veroy

Computational Framework for Accelerated Inverse Estimation in Nonlinear Coupled Problems
R. Dhopeshwar*, H. Bansal, K. Veroy

Multilevel Optimization for Inverse Problems
S. Weissmann, A. Wilson, **J. Zech***

Reduced multiscale Kalman inversion via deep learning
Y. Hong, **H. Bansal***, K. Veroy

Deep learning solvers for predicting alloy microstructure in additive manufacturing
G. Biros*

Mon, 05/06/2023 17:00 - 19:00 Athina - Athina III

IS27 - Computational Mechanics in Clinical Practice

Chaired by: Prof. ZOHAR YOSIBASH (Tel Aviv University), Dr. Nir Trabelsi (SCE-Shamoon College of Engineering)

Autonomous Finite Elements (AFE) are Used by Orthopedic Oncologists in Decisions About Prophylactic Surgery for Patients with Metastatic Tumors Keynote

Z. Yosibash*, K. Myers, A. Sternheim, N. Trabelsi

Individual Postoperative And Preoperative Workflow For Patients With Fractures Of The Lower And Upper Extremities

K. Wickert*, A. Andres, M. Roland, B. Braun, T. Histing, S. Diebels

Coupled of Autonomous Finite Element Analysis and Machine Learning for Hip Fracture Prediction Keynote

N. Trabelsi*, Z. Yosibash, I. Buchnik

Projection-based model order reduction incorporating geometry variability applied to cardiac mechanics

L. Wagmueller*, M. Gitterle, M. Wibmer, M. Gee

Patient-Specific 3D-0D Coupled Cardiovascular Model to Inform Pulmonary Valve Replacement in Tetralogy of Fallot Patients

T. Arjoune*, C. Meierhofer, H. Stern, P. Ewert, M. Gee

Mon, 05/06/2023 17:00 - 19:00 Athina - Ariadne

IS09 - II - - Coupled Simulations for Additive Manufacturing

Chaired by: Dr. Massimo Carraturo (University of Pavia)

Coupled Thermo-Mechanical Analysis of Additive Manufacturing process

J. Vořišek*, B. Patzák, M. Horák, Š. Michal

A Multiphysics numerical model for the laser metal deposition additive manufacturing process: Simplified approach & experimental validation

G. DALI*

Thermo-Mechanical Structural Optimization of a Chemical Propulsion Satellite Thruster Using Lattice Structures

S. Valvano*, A. Maligno

Inverse Homogenization Topology Optimization for the Design of □□New Cellular Materials

N. Ferro, **S. Perotto***

Tuesday, 06/06/2023

Tue, 06/06/2023 08:30 - 10:30 — Athina - Athina I

IS11 - I - - Immersed Boundary Methods for Coupled Problems

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

The Shifted Boundary Method and the Shifted Fracture Method Keynote
G. Scovazzi*, N. Atallah, K. Li, A. Rodriguez-Ferran

Numerical simulation of humeral neck fractures combining phase-field models and the parallel hp-adaptive finite cell method
L. Hug*, S. Kollmannsberger, Z. Yosibash, E. Rank

Weak and Strong Stabilisation of Cut Finite Element Methods
E. Burman*, P. Hansbo, M. Larson

A Continuous Forcing Immersed Boundary Approach to Solve the VARANS Equations in a Volumetric Porous Region
M. Vergassola*, O. Colomes

Application of immersed boundary methods for physics-driven generative design
N. Korshunova, L. Kudela, M. Straccia, **D. D'Angella***

Tue, 06/06/2023 08:30 - 10:30 — Imperial - Hall I

IS04 - I - - Advances in Multiphysics Modelling and Simulation of Electromagnetic Systems

Chaired by: Prof. Federico Moro (Università di Padova), Prof. Innocent Niyonzima (Université Grenoble Alpes)

Electro-thermal homogenisation of windings in high frequency electromagnetic devices at high frequency Keynote
R. V. Sabariego*, W. Martinez, J. Gyselinck

Effect of High Deformations on the Induction Heating of Thin Steel Sheets
V. Filkin, Y. Vetyukov, **F. Toth***

Stable and Accurate Method for Simulating the Anisotropic Diffusion in Toroidally Confined Magnetic Fields
D. Muir*, K. Duru, M. Hole, S. Hudson

Development of a Finite Strain Weakly Coupled Electro-Magneto-Thermo-Mechanical Model for Shape Memory Polymer Composites
V. Gholap*, L. Noels, C. Geuzaine

MHD Coupled Simulation of Taylor-Couette Flow of Liquid Metal
T. Hasebe*, T. Fujino, H. Takana, H. Kobayashi

Tue, 06/06/2023 08:30 - 10:30 — Imperial - Main

IS34 - Coupled Modelling and Computational Challenges in Transport , Energy and Buildings targeting carbon neutrality focusing on decarbonisation, energy efficiency and societal implications

Chaired by: Prof. Jacques Periaux (cimne)

Challenges in real practice applications of data-driven intelligence to decarbonize our buildings and cities
J. Cipriano*, G. Laguna, G. Mor

Research on Bayesian Optimization for Efficient Airfoil Design
Z. Liu*, X. Liu, H. Lyu

Nueva contribuciónMultidisciplinary shape design optimization" of a Blended Wing Body (BWB) aircraft Configuration with distributed propulsion
Z. Tanga, S. Luo , H. Li, **J. Periaux***

Tue, 06/06/2023 08:30 - 10:30 — Imperial - Hall II

IS14 - I - - Multi-Physics and Multi-Scale Simulations with the Coupling Library preCICE

Chaired by: Mr. Gerasimos Chourdakis (Technical University of Munich)

An introduction to the preCICE coupling library Keynote
F. Simonis*, B. Uekermann

Investigation of CFD-DEM momentum coupling results for AWJC Nozzle using preCICE
P. ADHAV*, X. BESSEON, B. PETERS

Hemodynamic evaluation of aortic aneurysms using FSI simulations
B. Chitneedi*, C. Karliampas, K. Giannakoglou

Towards Computational Efficient Fully Coupled Aeroelastic Simulations of Turbomachinery Blades with TRACE and CalculiX
M. Freimuth*, C. Berthold, F. Herbst

An HPC Multi-Physics Framework for Next-Generation Industrial Aircraft Simulations
E. Fadiga*, F. Rondina, S. Oliani, T. Benacchio, D. Malacrida, L. Capone

Tue, 06/06/2023 08:30 - 10:30 — Imperial - Hall III

IS29 - II - - Coupling image processing and computational modeling for biomedical applications

Chaired by: Prof. Suzanne Shontz (University of Kansas)

Coupling Image Processing and Dynamic High-Order Mesh Generation for Biomechanics Simulations
F. Mohammadi, **S. Shontz***, C. Linte

Efficient numerical methods for simulating cardiac electrophysiology with cellular resolution
F. Chegini*, A. Froehly, N. Huynh, L. Pavarino, M. Potse, S. Scacchi, M. Weiser

Immersed Techniques for Fluid-Structure Interaction with Applications to Computational Biomechanics
P. Zulian*, R. Krause, M. Nestola, D. Rossinelli

Convex-NonConvex (CNC) Variational Models and Algorithms for Inverse Imaging Problems
A. Lanza*, F. Sgallari, S. Morigi, M. Huska, I. Selesnick

Design of Stents Using Geometrically and Materially Nonlinear Topology Optimization Including Contact Mechanics
L. Rinderer*, M. Gee

Tue, 06/06/2023 08:30 - 10:30 — Imperial - Hall IV

IS13 - II - - Machine learning and uncertainty quantification for coupled multi-physics, multi-scale and multi-fidelity modelling

Chaired by: Dr. Irina Tezaur (Sandia National Laboratories)

Graph neural network predictions of energetic and mechanical properties of solid solution alloys
M. Lupo Pasini*, **G. Jung***, S. Irle

A Zonal Machine Learning Approach for Predicting Reynolds Stress in Turbulent Flows
A. Man*, A. Keshmiri, H. Yin, Y. Mahmoudi

Expressive Surrogate Models via Functional Tensor Networks
C. Safta*, A. Gorodetsky, J. Jakeman

Component-based model order reduction procedure for large scales Thermo-Hydro-Mechanical systems
A. Iollo, **G. Sambataro***, T. Taddei

Effect of Geometrical and Flow Parameters on the Heat Transfer of Impinging Jet on the Concave Surface
S. Salavatidezfouli*, S. Rakhsha, R. Halder, G. Stabile, G. Rozza

Tue, 06/06/2023 08:30 - 10:30 — Athina - Athina II

IS36 - - Simulation methods for coupled problems

Immersive metamaterial experimentation: implementation of a virtual periodic boundary condition
H. Thomsen*, B. Zhao, A. Colombi

Monolithic Newton-Multigrid FEM Solver for Nonlinear Multifield Coupled Problems: Application to thixotropic flow
N. Begum*

Modified Kirsch Problem Incorporating Surface Stresses under Plane Stress
A. Vakaeva*, M. Grekov

Modeling phase transformations and damage processes under complex boundary conditions by means of extremal principles
P. Junker*, C. Erdogan, F. Liu, M. Gierig, T. Bode, D. Jantos

Investigation of J-integrals and SIFs in piezoelectric materials by element differential method
L. Jin*, Y. Yang, Y. Li, R. Wang, J. Lv

Free and forced vibration analysis using the strong-form zonal free element method
X. Chu*, B. Li, Y. Li, J. Lv

Tue, 06/06/2023 08:30 - 10:30 — Athina - Athina III

IS18 - I - - Particle-based methods in Coupled Problems: advances and applications in DEM, PFEM, SPH, MPM, MPS and others

Chaired by: Prof. Sergio Idelsohn (CIMNE)

Partitioned MPM-FEM Coupling Approach for Advanced Numerical Simulation of Mass-Movement Hazards Impacting Flexible Protective Structures
V. Singer*, A. Larese, A. Börst, R. Wüchner, K. Bletzinger

A new remeshing strategy relying on level-set functions for the particle finite element method
E. Fernández*, S. Février, M. Lacroix, L. Papeleux, R. Boman, J. Ponthot

Coupled PD-DEM approach for modelling leading edge erosion of wind turbine blades due to solid particles impingement
K. Walayat*, S. Haeri

Coupling of a Vortex Particle Method with OpenFOAM for efficient external aerodynamic simulations
R. Pasolari*, C. Ferreira, A. Zuijlen

Neural Network Enhanced RKPM for Electrochemical-Mechanical Coupled Damage Modeling of Energy Storage Materials
K. Susuki*, J. Allen, J. Chen

Tue, 06/06/2023 08:30 - 10:30 — Athina - Ariadne

IS25 - I - - Multiphase flows in microfluidic applications: droplet dynamics, wetting, and transport in complex media

Chaired by: Prof. Pavel Ryzhakov (CIMNE, Barcelona)

Challenges of Numerical Simulation of Dynamic Wetting Phenomena **Keynote**
S. Afkhami*

3DDA: a novel python toolkit to analyse 3D-dynamic contact angles from Molecular Dynamics simulations
A. Maslov*

Direct Numerical Simulations of Sliding Droplets using a Phase-Field Approach
F. Bodziony*, H. Marschall

A robust level-set reconstruction scheme for the modelling of large droplet deformations
M. Hashemi*, A. Hashemi, R. Rossi, P. Ryzhakov

Tue, 06/06/2023 10:30 - 11:00 — Minoa Palace Resort Hotel

Coffee Break

Tue, 06/06/2023 11:00 - 13:15 — Imperial - Main

Plenary Lecture II - S. Idelsohn, R. Lohner and K. Veroy-Grepl

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

Coupling solid particles with fluids: a challenge in turbulent flows
S. Idelsohn*

Deterministic Pathogen Transmission via Coupled Computational Fluid and Crowd Dynamics
R. Lohner*

Model Order Reduction in the Parametrized Multi-Scale and Coupled Setting
K. Veroy-Grepl*

Tue, 06/06/2023 13:15 - 14:30 — Minoa Palace Resort Hotel

Lunch Break

Tue, 06/06/2023 14:30 - 16:00 — Imperial - Main

Plenary Lecture III - P. Díez and R. Codina

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

Reduced-Order Models in Bayesian solvers for inverse problems
P. Díez*, S. Zlotnik, A. Muixí, A. García-González

A Numerical Approach to Viscoelastic Fluid-Structure Interaction
R. Codina*

Tue, 06/06/2023 16:00 - 16:30 — Minoa Palace Resort Hotel

Coffee Break

Tue, 06/06/2023 16:30 - 18:30 — Imperial - Main

IS31 - I - - Sharing Advances in Modelling Techniques for Fluid-Structure Interaction

Chaired by: Prof. Vincent Faucher (CEA)

Sharing Advances in Modelling Techniques for Fluid-Structure Interaction : introduction and review
V. Faucher*, G. Ricciardi

A mixed Lagrangian-Eulerian formulation for free-surface fluid-structure interaction problems
M. Cremonesi*, C. Fu, U. Perego

A Dynamic Substructuring Method for FSI Problems with Fluid-Filled Pipes and Vessels
N. Tardieu*, M. El Haddad, P. Badel, J. Curt

A Novel Method to Compute Forced and Induced Motion of Rigid Body Based on Monolithic Eulerian Fluid-structure Interaction Scheme and Immersed Boundary Method
T. Shimada*, K. Nishiguchi, R. Bale, S. Okazawa, M. Tsubokura

X-Mesh: A new approach for the simulation of two-phase flow with sharp interface
J. Remacle*

Global sensitivity analysis of sound transmission loss of double-wall with porous layers
S. Bakhouche*, R. Aloui, W. Larbi, J. Deü, P. Macquart

Tue, 06/06/2023 16:30 - 18:30 — Athina - Athina I

IS11 - II - - Immersed Boundary Methods for Coupled Problems

Chaired by: Prof. Mats G. Larson (Umea University)

Non-Destructive Testing Using the Finite Cell Method **Keynote**
E. Rank*, T. Bürchner, P. Kopp, S. Kollmannsberger

Vibroacoustic Simulations of Acoustic Damping Materials Using the Finite Cell Method **Keynote**
L. Radtke*, A. Düster, P. Marter, F. Duvigneau, D. Juhre

IsoGeometric LaTIn method for non-conformal coupling with non-linear interface behaviour
E. Lapina*, P. Oumaziz, R. Bouclier

An isogeometric collocation framework for coupled electromechanical simulations
M. Torre*, S. Morganti, F. Pasqualini, A. Reali

Stabilized Unfitted Finite Element Method for Three-Dimensional Poroelasticity
Y. Zhang, Y. Wang, F. Wu, **Z. Liu***

Tue, 06/06/2023 16:30 - 18:30 — Imperial - Hall I

IS04 - II - - Advances in Multiphysics Modelling and Simulation of Electromagnetic Systems

Chaired by: Prof. Federico Moro (Università di Padova), Prof. Innocent Niyonzima (Université Grenoble Alpes)

The effect of inherent nonlinearities in coupled piezo-magneto-electric vibration energy harvester
R. Ardito*, M. Rosso

Multiphysics and Multiscale Modeling of Electrically Active Implants
R. Appali*, A. Gomes, H. Raben, U. van Rienen

Finite Element solution of flexophotovoltaics
S. Pérez Escudero*, D. Codony, S. Fernàndez-Méndez, I. Arias

Analysis of cracks in solids with flexomagnetic effect
M. Repka*, L. Sator

Development and comparison of three-dimensional h-conforming and b-conforming multiscale formulations for composites accounting for eddy currents
I. Niyonzima*, A. Marteau, G. Meunier, N. Galopin, O. Chadebec

Tue, 06/06/2023 16:30 - 18:30 — Imperial - Hall II

IS14 - II - - Multi-Physics and Multi-Scale Simulations with the Coupling Library preCICE

Chaired by: Mr. Gerasimos Chourdakis (Technical University of Munich)

Efficient Application of Accelerator Cards for Simulation of Coupled Problems
D. Schneider*, T. Schrader, B. Uekermann

An advanced Coupling Approach for Solving Corrosion and Fracture Mechanics using preCICE
C. Kandekar*, A. Ravikumar, D. Höche, W. Weber

Implementing a Comprehensive Hydromechanical Model for Sedimentary Basins by Coupling a 3D Mechanical Code to a Classic Basin Fluid Flow Code with the PreCICE Library
J. GRATIEN*, D. COLOMBO, S. DE CHAISEMARTIN, B. VIALEY, A. PASTEAU

Coupled Multiphysics Models in the Field of Pyrometallurgy
W. Roos*, A. Bogaers, J. Zietsman

Implementation and Formulation of a Multi-Region, Electromagnetic Solver for Discontinuous Media
A. Bogaers*, W. Roos, Q. Reynolds, J. Zietsman

Tue, 06/06/2023 16:30 - 18:30 Imperial - Hall III

IS26 - - Structure-preserving discretization methods for Coupled Problems

Chaired by: Prof. Peter Betsch (Karlsruher Institut für Technologie (KIT))

A preserving scheme for phase-change with sharp interface using the extreme mesh deformation approach (X-MESH) Keynote
N. Moes*, J. Remacle, J. Lambrechts, B. Le, N. Chevaugeon

Continuous and hybrid finite elements for port-Hamiltonian systems
A. Brugnoli*, R. Rashad, S. Stramigioli

High-Order Summation-By-Parts Finite Differences for the Second-Order Wave Equation with Piecewise Smooth Wave Speed
G. Eriksson*

A structure-preserving approach to simulating Hamiltonian systems with dissipation
S. Jeyakumar*, M. Kraus, D. Pfefferlé, M. Hole

Multi-block High-order Finite Difference Method for the Incompressible Navier-Stokes Equations in Complex Geometry
D. Niemelä*

A Polyconvexity-Inspired Mixed Formulation and Structure-Preserving Discretization for Coupled Nonlinear Electro-Thermo-Elastodynamics
M. Hille*, M. Franke, F. Zähringer, R. Ortigosa, P. Betsch, A. Gil

Tue, 06/06/2023 16:30 - 18:30 Imperial - Hall IV

IS12 - Interdisciplinary Alliance in Biosciences: From physics-basedanddata-driven multiscale modelling to medical applications

Chaired by: Prof. Roderick Melnik (MS2Discovery, Wilfrid Laurier University)

Interdisciplinary approaches in Biotechnology and Bio-innovation: Precision medicine and human genome editing Keynote
N. Tavernarakis*

Estimating Latent Fields in Stochastic Dynamical Systems - A Case Study of COVID-19 in New Mexico
J. Ray*, C. Safta

Coupled Spatio-Temporal Dynamics and Nonlocality in Advanced Mathematical Models for the Analysis of Complex Neurodegenerative Disease Pathologies
S. Pal, **R. Melnik***

Coupling Mechanics with Spinodal Decomposition Phenomena
H. Oudich*, P. Carrara, L. De Lorenzis

Determination of the relationship between respiratory diseases and pollutants in the atmospheric air of the city using machine learning methods
N. Temirbekov, **D. Tamabay***, M. Temirbekova

Tue, 06/06/2023 16:30 - 18:30 Athina - Athina II

IS15 - I - - Multiscale and coupled problems in bioengineering

Chaired by: Dr. Eduardo Divo (Embry-Riddle Aeronautical University)

A Multiphysics Cardiac Model Integrating Electrophysiology, Muscular Mechanics and Hemodynamics Keynote
M. Bucelli*, A. Zingaro, P. Africa, I. Fumagalli, L. Dede', A. Quarteroni

A Novel Musculoskeletal-driven Exoskeleton Framework for Spina Bifida Rehabilitation in Infants Keynote
V. Huayamave*, E. Vela, T. Chambers, W. Kim

A mechanobiological bone remodelling model coupling bone physiology and systemic calcium and phosphorus homeostasis
J. Martinez-Reina*, J. Calvo-Gallego, F. Gutiérrez-Millán, P. Pivonka

Assessing Scaling and Kinematic Errors in a Coupled Experimental-Computational Infant Musculoskeletal Model
T. Chambers*, C. Walck, E. Mannen, V. Huayamave

Tue, 06/06/2023 16:30 - 18:30 Athina - Athina III

IS18 - II - - Particle-based methods in Coupled Problems: advances and applications in DEM, PFEM, SPH, MPM, MPS and others

Chaired by: Prof. Sergio Idelsohn (CIMNE)

Evaluating the agglomeration risk in a Wurster fluidized bed coater using coarse-grained CFD-DEM
S. Irndorfer*, P. Liu, D. Eisenberg, L. Contreras, D. Jajcevic, J. Khinast

Topology Optimization Using the Discrete Particle Model With Multibody Interactions
A. Kumar*, S. Vedantam

Constitutively informed particle dynamics: A new paradigm for discrete particle models
M. Uchimali, **S. Vedantam***

Multi-scale modeling of thermo-mechanically coupled processes in granular materials
J. Alvarez, **H. Cheng***, S. Luding, A. Hazel, T. Weinhart

Zonal Finite Line Method for Coupled Heat Transfer Between Fluid-Solid Structures
X. Gao*, H. Liu

Modeling Failure in Hyperelastic Solids Interacting With Fluids
K. Phanindra*, S. Vedantam

Tue, 06/06/2023 16:30 - 18:30 Athina - Ariadne

IS25 - II - - Multiphase flows in microfluidic applications: droplet dynamics, wetting, and transport in complex media

Chaired by: Dr. Tomislav Maric (TU Darmstadt), Dr. Mohammad R. Hashemi (CIMNE, Barcelona)

Towards electrohydrodynamic cone-jet regime simulation in planar films for microfluidic-based manufacturing
C. Narvaez, M. Hashemi, **P. Ryzhakov***, J. Pons-Prats

Balancing Forces in a Segregated Polyhedral Finite-Volume Solution of Single-Field Navier-Stokes Equations for Incompressible Two-Phase Flows
T. Maric*

Bubble Detachment and Convection in a Simplified Porous Electrode of an Alkaline Electrolyser
E. Mahravan*, P. Forooghi

On the dynamics of capillary rise: Dissipative mechanisms and non-linear oscillations
M. Fricke*, E. Ouro-Koura, S. Raju, J. De Coninck, D. Bothe

Tue, 06/06/2023 20:00 - 23:00
Banquet

Wednesday, 07/06/2023

Wed, 07/06/2023 09:00 - 11:00 — Imperial - Main

IS31 - II - - Sharing Advances in Modelling Techniques for Fluid-Structure Interaction

Chaired by: Phd. Guillaume Ricciardi (Cea)

Fluid effects on the seismic response of a seismically isolated nuclear spent fuel storage pool
N. Moussallam*, S. Lehmann

An Arbitrary Lagrangian Eulerian Approach for Air-Structure Interaction Problems: an Application to MEMS Micromirrors
D. Di Cristofaro*, M. Cremonesi, A. Frangi

High-fidelity simulations of liquid-gas-solid interactions during liquid metal casting processes
J. Qiao*, A. Riaz, E. Balaras

Layered Model of Fluid-Structure Interaction in Dry Wire Drawing with Coupled Axial Velocity
M. Vervaecke*, D. Fauconnier, J. Degroote

Coupled Simulations of Extreme Fluid-Structure Dynamics
V. Aune*, G. Valsamos, F. Casadei

On Numerical Simulation of Fluid - Structure- Acoustic Interactions Related to Human Phonation Process
P. Sváček*, J. Valášek

Wed, 07/06/2023 09:00 - 11:00 — Athina - Athina I

IS11 - III - - Immersed Boundary Methods for Coupled Problems

Chaired by: Prof. Guglielmo Scovazzi (Duke University)

An Eulerian finite element method for tangential Navier-Stokes equations on evolving surfaces Keynote
M. Olshanskii*, A. Reusken

Adaptive Geometric Multigrid for Finite Cell Flow
P. Saberi*, G. Meschke, A. Vogel

phi-FEM for creeping flows around moving particles
M. Duprez, V. Lleras, **A. Lozinski***

A CutFEM divergence-free discretization for the Stokes problem
H. Liu, **M. Neilan***, M. Olshanskii

Flow-induced oscillation of compliant valve leaflets within a plane channel flow
J. Wang*, A. Nitti, M. De Tullio

Wed, 07/06/2023 09:00 - 11:00 — Imperial - Hall I

IS04 - III - - Advances in Multiphysics Modelling and Simulation of Electromagnetic Systems

Chaired by: Prof. Federico Moro (Università di Padova), Prof. Innocent Niyonzima (Université Grenoble Alpes)

Dynamic coupling between particle-in-cell, atomistic, and finite element simulations
A. Kyritsakis*, T. Tiirats, R. Koitermaa, M. Veske, V. Zadin, F. Djurabekova

Simulating the Highly Coupled Physics of Electron Emission
S. Barranco Cárceles*, A. Kyritsakis, V. Zadin, A. Mavalankar, I. Underwood

Modelling of functionally graded magneto-electro-elastic micro/nano plates by Moving Finite Element Method
L. Sator*, M. Repka

Magnetic Scalar Potential Formulations for the Fast Solution of 3D Eddy-Current Problems in Multiply-Connected Domains
F. Moro*, A. Napov, M. Pellikka, J. Smajic, L. Codecasa

Wed, 07/06/2023 09:00 - 10:00 — Imperial - Hall I

IS14 - III - Multi-Physics and Multi-Scale Simulations with the Coupling Library preCICE

Chaired by: Dr. Benjamin Uekermann (University of Stuttgart)

Partitioned Flow Simulations with preCICE and OpenFOAM
M. Mühlhäußer*, G. Chourdakis, B. Uekermann

Flexible and sustainable software for coupling mixed-dimension simulations
G. Chourdakis*, E. Zonta, B. Uekermann

A Biophysically-Based Model of an Agonist-Antagonist Muscle Pair Using the Coupling Library preCICE
C. Homs-Pons*, M. Schulte

Wed, 07/06/2023 09:00 - 11:00 — Imperial - Hall III

IS02 - I - - Advanced Mathematical Modeling, Methods and Algorithms for Sustainability

Chaired by: Prof. Tomás Chacón (Universidad de Sevilla)

Boussinesq/Navier Stokes Two Way Coupling for the Simulation of Water Wave/Structure Interaction Keynote
U. Bosi*, M. Bergmann, M. Parisot

Sparse Identification of Parametrized Flow Dynamics
M. Oulghelou*, A. Ammar

Problem oriented discretizations for reaction-diffusion models in sustainability
A. Cardone, D. Conte, G. Frasca-Caccia, J. Martın-Vaquero, **G. Pagano***, B. Paternoster

Wed, 07/06/2023 09:00 - 11:00 — Imperial - Hall IV

IS22 - I - - Iterative Methods and Preconditioners for Challenging Multiphysics Systems

Chaired by: Dr. Matthias Mayr (Universität der Bundeswehr München)

Towards a scalable fully-implicit VMS formulation for compressible visco-resistive MHD for application to MCF in Tokamak relevant geometries
J. Bonilla*, J. Shadid, X. Tang, P. Ohm, E. Phillips, M. Crockatt, R. Pawlowski

Multigrid preconditioning for mixed-dimensional beam/solid coupling
M. Firmbach*, A. Popp, M. Mayr

Adaptive Coarse Space for Saddle Point Problem
**F. Nataf ***, P. Tournier

Co-Design of Variational Formulations of Chemo-Mechanics and the Parallel FROSch Solver Framework
F. Röver*, B. Kiefer, S. Prüger, O. Rheinbach

Wed, 07/06/2023 09:00 - 10:00 — Athina - Athina II

IS15 - II - - Multiscale and coupled problems in bioengineering

Chaired by: Prof. Alain Kassab (University of central florida)

Self-Powered Injection-Jet Fontan Circulation to Drop Caval Pressure in a Failing Fontan
R. Prather*, A. Das, E. Divo, T. Hsia, A. Kassab, W. DeCampli

On the 2D-1D Coupling in Numerical Simulations of Simplified Air Flow Model in Human Airways
T. Bodnár*, A. Lancmanová

A Multiscale and Multiphase Digital Twin of Function-Perfusion Processes in the Human Liver
T. Ricken*, L. Mandl, S. Gerhäusser, L. Lambers, A. Mielke

Wed, 07/06/2023 09:00 - 11:00 — Athina - Athina III

IS32 - I - - Flow-Structure Interaction in Bio-Inspired Locomotion/Transport Problems: Methods and Applications

Chaired by: Prof. Marco D. de Tullio (Politecnico di Bari)

Thrust Performance and Flow Physics of Wave Assisted Propulsion Systems
J. Seo*, H. Raut, R. Mittal

Multiphysics aspects of rowing propulsion in oblate jellyfish: from neuronal excitation to locomotion
A. Nitti*, M. Torre, A. Reali, M. de Tullio

Couple Fluid-Structure Interaction Simulations of the Jets Generated by Upside-Down Jellyfish
L. Miller*, M. Santiago, A. Hoover

DeepPIV and EyeRIS: Novel in situ imaging systems that enable time-resolved visualizations of particles and animals in the deep sea
K. Katija*, J. Daniels, E. Orenstein, P. Roberts, J. Erickson, D. Klimov, A. Sherman

Interfacing in-Silico and in-Situ Experiments of Organismal Fluid Pumping
A. Hoover*, K. Katija, J. Daniels

The Challenges of Simulating Jellyfish with Biologically Descriptive Oral Arms
M. Santiago*, A. Hoover, A. Connolly, C. Ramirez, L. Miller

Wed, 07/06/2023 09:00 - 11:00 — Athina - Ariadne

IS03 - I - - Advances in analysis, algorithms, and software for the coupling of conventional and data-driven models for heterogeneous multi-scale, multi-physics simulations

Chaired by: Dr. Paul Kuberry (Sandia National Laboratories)

Alternating Schwarz-based coupling of conventional and data-driven models
I. Tezaur*, J. Barnett, A. Mota

ITHACA-FV a C++ library for model order reduction based on OpenFoam
G. Stabile*, G. Rozza

Continuous modeling of a particle flow: CFD/AI coupling
Q. Darves-Blanc*, O. Bonnefoy, S. Martin, Y. Gavet, G. Kauric, C. Macqueron, J. William, A. Ndiaye

Multirate Integration Schemes for Diffusive Problems with Interfacial Coupling
P. Bochev, **J. Connors***, P. Kuberry, J. Owen

A black-box coupling scheme for higher-order multirate time stepping with preCICE
B. Rodenberg*, B. Uekermann, H. Bungartz

Wed, 07/06/2023 10:00 - 11:00 — Athina - Athina II

IS28 - - Coupled Groundwater–Surface Water Modelling

Chaired by: Dr. Corey Trahan (USACE-ERDC-ITL)

Multiphysics modelling of salt tracer tests in karst aquifers under laboratory conditions
K. Zivkovic*, M. Zelenika, H. Gotovac

Geometrically intrinsic modeling of 2D diffusive wave overland flow for coupled surface-subsurface hydrological applications
E. Bachini*, M. Camporese, A. Larese, M. Putti

Wed, 07/06/2023 11:00 - 11:30 — Minoa Palace Resort Hotel

Coffee Break

Wed, 07/06/2023 11:30 - 13:00 — Imperial - Main

Plenary Lecture IV - K. C. Park and A. De Simone

Chaired by: Prof. Ramon Codina (Universitat Politècnica de Catalunya)

A New Paradigm for Multiphysics Simulation: Its Initial Application to Fluid-Structure Interaction
K. Park*, J. González

Coupled problems in bio-inspired robotics
A. De Simone*

Wed, 07/06/2023 13:00 - 14:00 — Minoa Palace Resort Hotel

Lunch Break

Wed, 07/06/2023 14:00 - 16:00 — Imperial - Main

IS31 - III - - Sharing Advances in Modelling Techniques for Fluid-Structure Interaction

Chaired by: Prof. Vincent Faucher (CEA)

FloatStepper – A new fluid-body coupling method in OpenFOAM
J. Roenby*, H. Bredmose

A Fluid-Structure Interaction Solver based on lattice-Boltzmann and Immersed Boundary methods with Applications to the Aortic Valve.
T. Fringand*, I. Cheylan, M. Lenoir, L. Mace, J. Favier

Benchmark of CFD/FEM coupled and chained approaches for the prediction of the axial flow-induced vibration on a cantilever rod
J. Galpin, C. Collignon, P. Blanc, **M. Robin-Boudaoud***, N. Goreaud

Euler-Lagrange code coupling for blast wave propagation studies.
T. CHANTRAIT*, S. DEL PINO, S. JAOUEN, E. LABOURASSE

Mechanically Consistent Modeling of Fluid-Structure-Contact Interaction without Collision Paradox
M. Champion*, M. Fernandez, C. Grandmont, F. Vergnet, M. Vidrascu

Sound Insulation Optimization of a Roller Shutter Box
S. Bakhouche*, W. Larbi, J. Deü, P. Macquart

Wed, 07/06/2023 14:00 - 16:00 — Athina - Athina I

IS11 - IV - - Immersed Boundary Methods for Coupled Problems

Chaired by: Dr. Maxim Olshanskii (University of Houston)

Interpolation-Based Immersed Finite Element and Isogeometric Analysis With Application To Thermoelasticity **Keynote**
J. Evans*, N. Wunsch, J. Fromm, K. Maute, D. Kamensky

Space-time unfitted finite element methods for PDEs with dynamic interfaces **Keynote**
S. Badia*, H. Dilip, P. Martorell, F. Verdugo

Unfitted finite element methods for the Cahn-Hilliard equation
I. Hammer, **A. Massing***

Cut Finite Element Methods for the Computational Modeling of Geometrically Resolved Excitable Cells
N. Berre*, A. Massing, M. Rognes

Wed, 07/06/2023 14:00 - 16:00 — Imperial - Hall II

IS19 - I - - Quasi-Newton techniques for partitioned simulation of coupled problems

Chaired by: Prof. Joris Degroote (Ghent University), Dr. Norbert Hosters (RWTH Aachen University)

Recent Developments in Quasi-Newton Techniques for Partitioned Simulation of Coupled Problems
J. Degroote*, M. Schulte, N. Hosters

Time adaptive Waveform-Relaxation methods for Fluid Structure Interaction
P. Birken*, N. Kotarsky

Interface Quasi-Newton Methods in Context of Continuous Space-Time Finite Elements
N. Hosters*, T. Spenke

Two-way coupling in mixed-dimensional fluid/beam interaction
M. Mayr*, N. Hagmeyer, A. Popp

The effect of the number of subproblem iterations in partitioned fluid-structure interaction simulation
N. Delaissé*, T. Spenke, N. Hosters, J. Degroote

An Implicitly Coupled Finite Element - Electronic Circuit Simulator Method for Efficient System Simulations of Piezoelectric Energy Harvesters
A. Hegendörfer*, J. Mergheim

Wed, 07/06/2023 14:00 - 16:00 — Imperial - Hall III

IS02 - II - - Advanced Mathematical Modeling, Methods and Algorithms for Sustainability

Chaired by: Simona Perotto (MOX, Department of Mathematics, Politecnico di Milano)

Oil Spill in Harbours: the Augusta Case
F. De Leo*, L. Cavallaro, F. Roman

Thermal-comfort cloister shape optimisation by Reduced Basis modelling
T. Chacón Rebollo*, C. Caravaca García, M. Gómez Mármol

Reduced Order Modelling and Visualization for the optimization of high temperature Concentrated Solar Power tower receivers
J. Valverde*, J. Galán-Vioque, J. Herruzo, T. Chacón, C. Núñez, S. Rubino

A Coupling Methodology Implementing High-fidelity and Reduced-order Models for the Simulation of Bi-fluid Flows
B. Battisti*, M. Bergmann

Wed, 07/06/2023 14:00 - 16:00 — Imperial - Hall IV

IS22 - II - - Iterative Methods and Preconditioners for Challenging Multiphysics Systems

Chaired by: Dr. Max Firmbach (Universität der Bundeswehr München)

Domain Decomposition Methods for the Stokes-Darcy Problem
M. Discacciati*, L. Gerardo-Giorda, T. Vanzan

qMG: Quantum Multigrid Algorithm
O. Raisuddin*, S. De

A fully conservative, asymptotic preserving multiscale solver for the Rosenbluth-Fokker-Planck equation
W. Taitano*, S. Anderson, L. Chacon

Wed, 07/06/2023 14:00 - 16:00 — Athina - Athina II

IS35 - Coupled problems with geometric reduction methods

Chaired by: Dr. Daniel Rabinovich (Technion - Israel Institute of Technology)

Mixed-Dimensional Coupling using the DtN Method for Time-Dependent Acoustics
D. Givoli, **D. Rabinovich***

Multiphysics Numerical Investigations of Hot Components in a sCO2 Power Plant Turbine
G. Generini*, I. Rafanelli, A. Andreini, M. Dozzini, A. Milani, M. Bigi, A. Ciani

Exploring a possibility of an application of the statistical methods to modelling thermomechanical processing of steels with heterogeneous microstructure
K. Bzowski*, M. Pietrzyk, D. Szeliga, L. Rauch

Wed, 07/06/2023 14:00 - 16:00 Athina - Athina III

IS32 - II - - Flow-Structure Interaction in Bio-Inspired Locomotion/Transport Problems: Methods and Applications

Chaired by: Prof. Marco D. de Tullio (Politecnico di Bari)

Bioinspired fluid-structure interaction problems using a multi-body structural model
C. Martinez-Muriel*, G. Arranz, O. Flores, M. Garcia-Villalba

Aeroelastic Simulation and Data Driven Analysis of Bat-Inspired Membrane Wings
S. Kumar*, J. Seo, R. Mittal

Development of an FSI environment for the aerodynamic performance assessment of flapping wings
R. Poletti*, M. Barucca, L. Koloszar, M. Mendez, J. van Beeck, J. Degroote

A numerical approach for the characterization of the free fall of thin disks
A. Lolli*, G. Corsi, A. De Simone

Simulation of a slender flexible structure in viscous flow by finite difference/isogeometric immersed boundary method
V. Agrawal*, A. Kulachenko, O. Tammisola, L. Brandt

Neural network control of fully-differentiable fluid-rigid structure interaction problem
J. Yang, M. Zhang, A. Buchan, **L. Yang***

Wed, 07/06/2023 14:00 - 16:00 Athina - Ariadne

IS03 - II - - Advances in analysis, algorithms, and software for the coupling of conventional and data-driven models for heterogeneous multi-scale, multi-physics simulations

Chaired by: Dr. Irina Tezaur (Sandia National Laboratories)

Interface Flux Recovery Framework for Constructing Partitioned Heterogeneous Time-Integration Methods
K. Sockwell, P. Bochev, K. Peterson, **P. Kuberry***

Accelerating the FlowSimulator: Improvements in FSI Simulations for the HPC Exploitation at Industrial Level
M. Cristofaro*, J. Fenske, I. Huismann, A. Rempke, L. Reimer

Computational Homogenization of Flows with Obstacles
M. Shakoor*, C. Park

Unraveling Neural Networks with Structure-Preserving Computing
W. Schilders*

Wed, 07/06/2023 16:00 - 16:15 Imperial - Main

Closing ceremony