

M2P 2023 Technical Programme

Monday, 29/05/2023

Mon, 29/05/2023 18:00 - 20:00
Pre-Registration

Hotel Diodoro

Tuesday, 30/05/2023

Tue, 30/05/2023 07:00 - 12:00
Registration

Hotel Diodoro

Tue, 30/05/2023 08:00 - 08:15
Opening Ceremony

Salone Congressi

Tue, 30/05/2023 08:15 - 10:15

IS01a - - Innovative modeling and computational approaches for living systems and precision medicine

Chaired by: Paolo Zunino (MOX, Department of Mathematics, Politecnico di Milano)

Salone Congressi

Mechanobiology of cancer progression **Keynote**

M. Raimondi*, A. Bocconi, C. Conci, E. Jacchetti, C. Martinelli, A. Nardini, C. Testa

A Biophysically Detailed Computational Model of the Four Chamber Human Heart Electromechanics

F. Regazzoni*, M. Fedele, R. Piersanti, M. Salvador, P. Africa, M. Bucelli, A. Zingaro, L. Dede', A. Quarteroni

Computational Modeling of Clinical Intervention in Heart Valve Disease Through Patient-Specific Simulations

J. Kronborg*, J. Hoffman

Efficient Active Learning for Realtime MRI of Patients with Congenital Heart Disease

P. Rosauer*, A. Wendler, A. Bach, C. Hart, D. Gerlach

Tue, 30/05/2023 08:15 - 10:15

IS27 - - Computational methods and models for industrial applications – the young investigators' perspective (EYIC)

Chaired by: Prof. Simone Morganti (University of Pavia)

Salone Giardino 1

Topology Optimization-Assisted Innovative Design of Femoral Artery Stents **Keynote**

N. Ferro*, F. Mezzadri, S. Perotto, D. Carbonaro, C. Chiastra, D. Gallo, U. Morbiducci

Numerical Design Methods for Injection Molding

R. Pohlmann*, S. Elgeti

Innovative Design of Soilless Growing Media: a Multiscale Topology Approach

G. Speroni*, S. Perotto, N. Ferro

Numerical methods for 3D geological restoration

A. Scotti, G. Scrofani, L. Formaggia, **E. Braun***, A. Fumagalli, P. Sala, M. Balestra, M. Martinelli, A. Filippini

A Weather Generation Model to Evaluate the Impact of Meteorological Variability on Crop Growth

G. Varini*, A. Sorrentino, A. Pascarella

Tue, 30/05/2023 08:15 - 10:15

IS21a - - Recent advances in shape and topology optimization

Chaired by: François Jouve (LJLL - Université Paris Cité)

Salone Giardino 2

One-sided Derivative of Parametrized Minima for Shape and Topological Derivatives

M. Delfour*

Approximation of perimetric functionals for topology optimization

S. Amstutz*

Spline-Based Optimization Techniques for Molding Processes

F. Zwicke*, S. Elgeti

Design of Metasurface-based Broadband Acoustic Diffuser with Topology Optimization

Z. Wang*, R. Li, W. Ye

Nonsmooth Shape Optimisation in Linear Elasticity with Stress Constraints

P. Baumann*, K. Sturm

OpenPisco: An open source platform for optimal design

C. Nardoni*, D. Danan, F. Bordeu, J. Cortial

Tue, 30/05/2023 08:15 - 10:15

IS17a - - Advanced numerical models for industrial applications based on the OpenFOAM library

Chaired by: Nicola Parolini (MOX, Department of Mathematics, Politecnico di Milano)

Salone Giardino 3

A Multiphysics Numerical Analysis and Non-Intrusive Reduced Order Model of a Domestic Fridge

R. Haider*, A. Hajisharifi, M. Girfoglio, G. Stabile, G. Rozza

Kernel-based surrogate for fluid dynamics simulation of wind assistant propulsion

D. Baroli*, M. Zanichelli, F. Piscaglia, E. Gallorini, L. Valsecchi, P. Motta, M. Multerer, K. Charpot, G. Provinciali

An OpenFOAM-based tool for Real-time Data Assimilation in Continuous Casting Molds

G. Stabile*, U. Morelli, P. Barral, P. Quintela, G. Rozza

Face-Centred Finite Volume, Ansys Fluent and OpenFOAM: Friends or Foes?

M. Giacomini*, D. Cortellessa, J. Vila-Pérez, A. Huerta

A Non_Intrusive Data_Driven Reduced Order Model For Parametric CFD-DEM Numerical Simulations

A. Hajisharifi*, M. Girfoglio, D. Bonanni, G. Rozza

Performance Enhancement of a Checkerboard Counterflow Heat Exchanger for Industrial Applications

N. Parolini*, L. Bonaventura, V. Covello, M. Verani, A. Della Rocca

Tue, 30/05/2023 08:15 - 10:15

Salone Giardino 4

IS16a - - Neural PDE Solvers

Chaired by: Paris Perdikaris (University of Pennsylvania)

Scalable Neural Wavefunctions for Quantum Monte Carlo

J. Richter Powell*

On solving/learning nonlinear PDEs with GPs

H. Owjadi*

Resolution Invariant Generative Models for Functional Data

J. Seidman*, G. Kissas, G. Pappas, P. Perdikaris

Competitive Physics-Informed Networks

Q. Zeng, Y. Kothari, S. Bryngelson, **F. Schaefer***

Scientific machine learning models for cardiovascular computational medicine

S. Paganì*, F. Regazzoni, L. Dede, A. Quarteroni

Tue, 30/05/2023 08:15 - 10:15

Sala Belvedere

IS28 - - Statistical learning from complex data for industry and society

Chaired by: Alessandra Menafoglio (MOX – Department of Mathematics, Politecnico di Milano)

Safari Njema: Data-driven design of mobility services in sub-Saharan countries

A. Burzacchi*, M. Landrò, A. Calissano, A. Mascaretti, S. Vantini

Quality Control and Anomaly Identification in Manufacturing: Applying Functional Statistics to the Case of Complex Shapes

R. Scimone*, T. Taormina, B. Colosimo, M. Grasso, A. Menafoglio, P. Secchi

Modelling transport network using mobile data

D. Di Antonio*, M. Galvani, G. Chiodi, D. Mancuso

The Analysis of Sets of Networks With Applications to Public Transport Systems.

A. Calissano*, A. Feragen, S. Vantini

Elastic full Procrustes analysis of shape variability in plane curves via Hermitian covariance smoothing

A. Stöcker*, M. Pfeuffer, L. Steyer, S. Greven

Deciphering the Topological Structure of Glasses for Lithium Batteries

M. Pegoraro*, Y. Bokor, T. Heiss, C. Biscio, A. Svane, L. Fajstrup, A. Lindbjerg, R. Christensen, S. Sørensen, M. Smedskjaer

Tue, 30/05/2023 10:15 - 10:45

Coffee Break

Tue, 30/05/2023 10:45 - 12:45

Salone Congressi

IS01b - - Innovative modeling and computational approaches for living systems and precision medicine

Chaired by: Manuela Teresa Raimondi

Personalized Noninvasive Cardiovascular Monitoring via Ballistocardiography, Physiology-Based Modeling and Evolutionary Algorithm

M. Zaid*, N. Marazzi, L. Sala, S. Ahmad, L. Despina, M. Popescu, M. Skubic, J. Keller, G. Guidoboni

Cell-based Modelling and Simulation of Electrical and Chemical Interplay in Excitable Tissue

A. Ellingsrud*, M. Kuchta, R. Masri, G. Haines, G. Einevoll, M. Rognes

Multiscale and mixed-dimensional modeling of vascular tissues

C. Belpoer*, A. Caiazzo, L. Heltai, D. Peterseim

Uncertainty Quantification and Sensitivity Analysis for Non-invasive Model-based Instantaneous Wave-Free Ratio Prediction

C. Dalmaso*, F. Fossan, A. Bråten, L. Müller

Effect of microvascular network morphology on tissue oxygenation and radiotherapy outcome: a computational analysis

L. Possenti*, P. Vitullo, A. Cicchetti, T. Rancati, P. Zunino

A Multi-physics Reduced Order Model for the Vascular Microenvironment

P. Vitullo, A. Colombo, N. Franco, A. Manzoni, **P. Zunino***

Tue, 30/05/2023 10:45 - 12:45

Salone Giardino 1

IS31 - - Mathpreneurs - How math can become the core asset of new startups, generate jobs and transform the economy

Chaired by: Mr. Enrico Deluchi (Polihub, Milano)

How can my turtle (discovery) make it to the ocean? **Keynote**

M. Versace*

Turning mathematicians into business developers. The experience of MOXOFF in the time of AI

A. Quarteroni*

Genogra: Next-generation genome analysis platform

G. Di Donato*, A. Zeni, M. Coggi, G. Bruno, M. Santambrogio

A New Platform to Connect Industry and Mathematics in the European Landscape: The EU-MATHS-IN OpenDesk

M. Cruz*, V. Maume-Deschamps, P. Quintela, A. Scherrer, A. Sgalambro, J. Szwabinski

AMAZ3D: a new tool for the optimization of 3D graphic assets

L. Locatelli*, S. Perotto

Tue, 30/05/2023 10:45 - 12:45

Salone Giardino 2

IS21b - - Recent advances in shape and topology optimization

Chaired by: Alex Ferrer (CIMNE, Barcelona)

Variational Formulations in Displacement, Stress and Strain in Periodic Homogenization

C. Barbarosie*, A. Toader

The topological ligament: an approach based on thin tubular inhomogeneities

C. Dapogny*

Advances in High-Resolution Topology Optimization within Multi-Level Approaches

M. Bosch-Galera*, E. Nadal, J. Ródenas, E. Maunder

Shape Optimization of Metal Parts from Filament-Based AM Processes Based on Structural and Dimensional Analysis

G. De Pasquale, **F. Portis***

Shape optimization method for strength problems considering thermal expansion in a multiscale structure

M. Torisaki*, M. Shimoda

Concurrent multiscale optimization of macro and micro shapes of laminated shell structure

M. Hikasa*, M. Shimoda

Tue, 30/05/2023 10:45 - 12:45

Salone Giardino 3

IS17b - - Advanced numerical models for industrial applications based on the OpenFOAM library

Chaired by: Nicola Parolini (MOX, Department of Mathematics, Politecnico di Milano)

Numerical Simulation of Polymer Mixing Processes with the Immersed Boundary Method in OpenFOAM

G. Negrini*, N. Parolini, M. Verani, D. Ceroni

Improving airflow monitoring and control solutions in wind energy and agroecology sectors

V. Resseguier*, L. Wallian, D. Heitz, G. Stabile

A segregated Finite Volume - Spectral Element Method for aeroacoustic problems

A. Artoni*, N. Parolini, F. Semeraro, P. Schito, D. Rocchi, I. Mazzieri, P. Antonietti, R. Corradi

OpenFOAM Numerical Analysis of the Diurnal Cycle of Thermally-Driven Winds on Mars

S. Arias*, J. Rojas, A. Montlaur

An immersed boundary method in OpenFOAM for industrial applications

M. Girfoglio*, G. Rozza

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

Salone Giardino 4

IS16b - - Neural PDE Solvers

Chaired by: Paris Perdikaris (University of Pennsylvania)

Combining data and models to enable surrogate-based automatic discovery of engineering solutions.

R. Pestourie*

Tue, 30/05/2023 10:45 - 12:45

Sala Belvedere

IS19a - - Data-driven fluid mechanics

Chaired by: Dr. Anh Khoa Doan (Delft University of Technology)

Reynolds-averaged Closure Modelling with Uncertainty Quantification through Bayesian Deep Learning applied to Urban Flows

L. Cotteleer*, C. Nixaridis, A. Parente

Generative Adversarial Networks to infer velocity component in rotating turbulent flows

T. Li*, M. Buzdicotti, L. Biferale, F. Bonaccorso

Feature Extraction and Flow Control with Clustering Technique On Synthetic Jets

E. Muñoz*, H. Dave, G. D'Alessio, A. Parente, S. Le Clairche

X-AI in fluid dynamics: Explaining relaminarization events in wall-bounded shear flows.

M. Lellep*, J. Prexl, B. Eckhardt, M. Linkmann

Interpretable Compression of Fluid Flows Using Graph Neural Networks

S. Barwey*, R. Maulik

Tue, 30/05/2023 11:45 - 12:45

Salone Giardino 4

IS03a - - Data-driven reduced order modelling and surrogates with applications in complex multi-physics systems

Chaired by: Victorita Dolean Maini (University Cote d'Azur, France and University of Strathclyde, UK)

Non-intrusive Surrogate Modeling of Parametric Frequency-Response Problems

D. Pradovera*

Generating Problem-Adapted Basis Functions Parallel in Time via Random Sampling

J. Schleich*, K. Smetana, L. ter Maat

Modeling air pollution at a city scale

A. Somacal*, O. Mula, M. Dolbeault, A. Cohen

Tue, 30/05/2023 12:45 - 14:00

Lunch Break

Tue, 30/05/2023 14:00 - 15:00

Salone Congressi

PL1 - - Plenary Lecture - Irene Arias

Chaired by: Gianluigi Rozza (SISSA, Trieste)

Designing Flexoelectric Metamaterials Through Computational Strain Gradient Engineering

I. Arias*

Tue, 30/05/2023 15:15 - 16:55

Salone Congressi

IS01c - - Innovative modeling and computational approaches for living systems and precision medicine

Chaired by: Paolo Zunino (MOX, Department of Mathematics, Politecnico di Milano)

In-silico trials for bone-implant systems: challenges, influencing parameters and clinical application

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

A methodological overview over genetically-based NTCP models for late toxicity after prostate cancer RT

F. IEVA*, C. WEST, M. MASSI, N. FRANCO, A. PAGANONI, A. MANZONI, P. ZUNINO, T. RANCATI, A. DUNNING, P. SEIBOLD, A. WEBB, J. CHANG-CLAUDE

Improving the Success Rate for Thoracic Radiotherapy through Specific Cardiac Substructure Dosimetry: Location Matters.

A. Cicchetti*, A. Cavallo, S. meroni, A. Allajbej, C. Sangalli, P. Vallerio

Genetically-based analysis of bladder dose surface maps to identify subregions associated with late toxicities after prostate cancer radiotherapy

E. Gioscio*, R. Consortium, M. Massi, N. Franco, F. Ieva, A. Cicchetti, P. Zunino, A. Paganoni, A. Manzoni, C. West, J. Chang-Claude, P. Seibold, T. Rancati, R. Consortium

An Innovative Technical Rehabilitation Solution for Patients with Immobility Syndrome: The Pre-Clinical Results

R. Bernardes, V. Parola, R. Cardoso, H. Neves, A. Cruz, W. Xavier, R. Durães, **C. Maíça***

Tue, 30/05/2023 15:15 - 16:55

Salone Giardino 1

IS30 - - Physics-Based Machine Learning for Engineering Simulations and Digital Twin

Chaired by: Nicolo Spiezia (M3E), Dr. Caterina Millevoi (University of Padua)

Deep learning-based reduced order models for scientific applications

S. Fresca*, A. Manzoni

Inverse Modelling in Hydro-Poromechanics with PINN

C. Millevoi*, N. Spiezia, M. Ferronato

Towards Physics-Informed Machine Learning for Industrial Aerospace Applications: Perspectives and Expectations

F. Tucci*, D. Paniccia, M. Dessole, E. Pellegrino, N. Sanguini, T. Benacchio, L. Capone

Uncertainty Quantification for Transport in Porous media using Parameterized Physics Informed neural Networks

C. Frances*

Tue, 30/05/2023 15:15 - 16:55

Salone Giardino 2

IS05 - - Fast and efficient use of data

Chaired by: FRANCESCO CALABRO' (Università degli Studi di Napoli Federico II)

Ajourney on real-world maths-based applications. **Keynote**

R. Maccioni*

Heuristic Methods for Rapid Influence Maximization on Social Networks

R. Cerulli, C. D'Ambrosio, **A. Raiconi***

Machine Learning Assists to Solve Green Vehicle Routing Problem

R. Shahbazian*, F. Guerriero

Efficient Construction of Smooth PH Spline Paths for Autonomous Vehicles

V. Calabrò, C. Giannelli, **L. Sacco***, A. Sestini

Structural Health Monitoring of Mooring Systems for Floating Wind Turbines Using Artificial Intelligence

N. Gorostidi*, D. Pardo, V. Nava

Tue, 30/05/2023 15:15 - 16:55

Salone Giardino 3

IS02 - - Vehicular and pedestrian modeling: advances in research and technology transfer

Chaired by: Emiliano Cristiani (CNR-IAC, Roma)

Novel data-driven models for vehicular traffic at intersections

M. Herty*, N. Kolbe

Modern Calibration Strategies for Macroscopic Traffic Flow Models

P. Goatin*

Mathematics of Crowds Dynamics in Software Products – a Use Case

G. Köster*, A. Kneidl

A Digital Twin for Traffic Monitoring in Collaboration with Autovie Venete S.p.A.

M. Briani*, E. Cristiani, E. Onofri

Managing crowded museums: Visitors flow measurement, analysis, modeling, control, and optimization

P. Centorrino, E. Onofri, A. Corbetta, **E. Cristiani***

Tue, 30/05/2023 15:15 - 16:55

Salone Giardino 4

IS03b - - Data-driven reduced order modelling and surrogates with applications in complex multi-physics systems

Chaired by: Victorita Dolean Maini (University Cote d'Azur, France and University of Strathclyde, UK)

Lipschitz Stabilised Autoencoders to Study the Intrinsic Dimensionality of Dynamical Systems and Build Data-driven Models.

H. Liu*, D. Lombardi, M. Boulakia

Applying Gaussian Process Regression to Injection Moulding Including Material Uncertainty

S. Tillmann*, S. Elgeti

Programming Material Behaviour through Multiscale Optimization and Surrogate Models of Unit Cells

A. Lechner*, H. Andrä, T. Lichti, F. Wenz, C. Eberl, A. Schwarz, C. Hübner

Application of β -variational autoencoders to develop digital twin of a furnace operating in MILD combustion

R. Freitas*, A. Procacci, A. Parente

Tue, 30/05/2023 15:15 - 16:55

Sala Belvedere

IS19b - - Data-driven fluid mechanics

Chaired by: Dr. Anh Khoa Doan (Delft University of Technology)

Forecasting Extreme Events in Turbulence with a Convolutional Autoencoded Echo State Network

N. Doan*, A. Racca, L. Magri

Advanced data-driven tools for flow control in aeronautical applications

E. Lazpita*, J. Garicano, G. Paniagua, E. Valero, S. Le Clainche

Self-Tuning Model Predictive Control for Fluid Flows

L. Marra*, A. Meilán-Vila, S. Discetti

Optimal Control tools to minimize dispersion in turbulent flows

C. Calascibetta*, L. Biferale, F. Borra, A. Celani, M. Cencini

AI Modeling for Wetting Hydrodynamics

A. Demou*, N. Savva

Tue, 30/05/2023 17:30 - 18:30

Teatro Antico

Visit to Ancient Theatre - Group 1

Tue, 30/05/2023 18:30 - 19:30

Teatro Antico

Visit to Ancient Theatre - Group 2

Tue, 30/05/2023 20:15 - 22:00

Hotel Diodoro

Welcome Cocktail

Wednesday, 31/05/2023

Wed, 31/05/2023 08:30 - 09:30

Salone Congressi

PL3 - - Plenary Lecture - Charbel Farhat

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

Physics-Based Digital Twinning
C. Farhat*, M. Azzi

Wed, 31/05/2023 09:30 - 10:15

Salone Congressi

EV1 - - Event 1 - Don't be afraid by intellectual property, technology transfer and patents!

Paola Bagnoli (IRCCS Galeazzi, Sant'Ambrogio Hospital, Milano)

Wed, 31/05/2023 10:15 - 10:45

Coffee Break

Wed, 31/05/2023 10:45 - 12:45

Salone Congressi

IS20a - - Machine learning and optimization for industry and society

Chaired by: Giorgia Franchini (UNIMORE, Modena)

Recomposition of Parts Into Objects in Industrial Applications
M. Roffilli, F. Castelli*, E. Flebus, M. Neri

Deep Multi-Task learning for Automotive Perception
C. Scribano*

Deep Learning-Supported 3D Seismic Wavefield Generation Via Frequency Interpolation
N. Akram*, J. zhao, A. Hadjigeorgiou, N. Savva, E. Verschuur

Addressing Challenges in Industrial Pick and Place: A Deep Learning-Based 6D Pose Estimation Solution
E. Govi*, M. Bertogna, G. Franchini, L. Inghilterra, D. Sapienza, S. Toscani

Investigation of Reinforcement Learning in Shape Optimization
C. Fricke, D. Wolff, M. Kemmerling, S. Elgeti*

Wed, 31/05/2023 10:45 - 12:45

Salone Giardino 1

IS11a - - Advanced computational mechanics in real-world applications

Chaired by: Michele Girfoglio (SISSA, Trieste)

Reduced Order Model for the CFD Simulations of Stirred Bioreactors
U. Kaya*, G. Stabile, S. Gopireddy, N. Urbanetz, I. Nopens, J. Verwaeren

A Coupled VEM - MFD Formulation for Multiphase Flow and Poromechanics
A. Borio*, F. Hamon, N. Castelletto, T. Gazzola, M. Karimi-Fard, J. White, R. Settgest

A coupled CFD-DEM model for OKi Task production on Innojet V1000 Granulator
D. Bonanni*

Variational multiscale framework with isogeometric analysis for smooth-body flow separation in aerospace and environmental applications
S. Dave*, A. Korobenko

The Generalized Finite Difference Method for Solving the Streamfunction Formulation of the Navier-Stokes Equations
P. Li, C. Fan*

Wed, 31/05/2023 10:45 - 12:45

Salone Giardino 2

IS08a - - Mathematical software for Computational and Data Science at Extreme scales

Chaired by: Pasqua D'Ambra (CNR-Institute for Applied Computing, Napoli)

60 Years of the Mathematical Software Library HSL and Beyond
J. Scott*

Combining approximate factorizations with mixed precision iterative refinement for the solution of large sparse linear systems
P. Amestoy, A. Buttari*, N. Higham, J. L'Excellent, T. Mary, B. Viauble

An Adaptive Pencil Decomposition Library for Modern GPU Systems
M. Fatica*, J. Romero, P. Costa

Task-based Applications For Heterogeneous Computing Systems
H. Tayeb*, B. Bramas, A. Guermouche, M. Faverge

Building Interoperable and High Performance Mathematical Libraries for Exascale Computing
S. Li*

Wed, 31/05/2023 10:45 - 12:45

Salone Giardino 3

IS04a - - Numerical methods for coupled problems in geometrically complex domains

Chaired by: Francesco Ballarin (Università Cattolica del Sacro Cuore, Brescia)

A Reduced-Order Model for Complex Domain Problems in the Time- Continuous Space-Time Setting
F. Key*, M. von Danwitz, S. Elgeti

POD-Based Strategies For Varying Boundary Optimal Control
M. Strazzullo*, F. Vicini

Derivation and model error analysis of multidimensional time dependent solute transport models
R. Masri*, M. Zeinhofer, M. Kuchta, M. Rognes

Heterogeneous Asynchronous Time Integrator and mortar approach in nonlinear dynamics: Co-simulation for concrete gravity dams under earthquake loading and IGA-PML

M. BRUN*, A. CHAU, F. De Martin, N. Richart, T. Elguedj, A. Gravouil

Reduced Order Models for Flows in Fractured Porous Media

E. Ballini*, L. Formaggia, A. Fumagalli, A. Manzoni, S. Micheletti, A. Scotti, P. Zunino

Wed, 31/05/2023 10:45 - 12:45

Salone Giardino 4

IS15 - - CAD-based modeling, simulation, and optimization

Chaired by: Konstantin Key (TU Wien)

Volumetric Representations: Design, Analysis, Optimization, and Fabrication of Porous/Heterogeneous Artifacts and Microstructures

Keynote

G. Elber*

Spline-Based Parameterisation Techniques and Applications to Networks

J. Hinz*, A. Buffa, P. Antolin

Combined Parameter and Shape Optimization of an Electric Machine with Isogeometric Analysis

M. Wiesheu*, S. Schöps, T. Komann, S. Ulbrich, I. Garcia

Numerical investigation to the deformation of measured large-scaled structures based on Isogeometric Analysis

A. Luther*

Exploration and Exploitation of Deep Learning for Automatic Design

K. Key*, S. Elgeti

Wed, 31/05/2023 10:45 - 12:45

Sala Belvedere

IS09a - - Advanced numerical methods for predictive digital twins

Chaired by: Andrea Manzoni (Politecnico di Milano)

Learning Reduced-Order Dynamics with Probabilistic Methods

M. Guo*

Reduced order models for time-dependent problems using the Laplace transform

R. Reyes*, J. Hesthaven, S. Vallaghe, D. Knezevic

Digital Twins for Predictive Maintenance in Industry

K. Aly*, G. Rozza

Reduced order modeling of parametrized systems through autoencoders and dynamics identification

P. Conti*, G. Gobat, S. Fresca, A. Manzoni, A. Frangi

Development of a Multi-Fidelity Surrogate Model of a Combustion Chamber: High-Fidelity Data Effect on Prediction Accuracy

A. Özden, **R. Malpica Galassi***, F. Contino, A. Parente

Efficient Markovian Framework for Digital Twinning Applications in Production System Engineering

N. Hadžić*, V. Ložar, T. Opetuk, R. Keser

Wed, 31/05/2023 12:45 - 14:00

Lunch Break

Wed, 31/05/2023 14:00 - 15:00

Salone Congressi

PL2 - - Plenary Lecture - Paola Goatin

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

Traffic flow models for current and future mobility challenges

P. Goatin*

Wed, 31/05/2023 15:00 - 15:45

Salone Congressi

EV2 - - Event 2 - Twin interview from academia and industry: parallel or orthogonal perspectives?

Charbel Farhat, Cristina Nava, Alfio Quarteroni, Federica Valdenazzi

Chaired by: Luca Tremolada (Giornalista)

Wed, 31/05/2023 15:45 - 16:15

Coffee Break

Wed, 31/05/2023 16:15 - 18:15

Salone Congressi

IS20b - - Machine learning and optimization for industry and society

Chaired by: Giorgia Franchini (UNIMORE, Modena)

Enhanced Reinforcement Learning-Based Shape Optimization with Flow Field Information

C. Fricke*, D. Wolff, M. Kemmerling, S. Elgeti

Speckle noise removal via learned variational models

M. De Rosa, S. Izzo, **M. Pragliola***, S. Cuomo, F. Piccialli

Establishment Of A Public Mental Health Records Registry In The Ferrara Province: Adaptation Of A 30-Year-Long Clinical Database For Research Purposes

M. Ferrara*, E. Gentili, M. Belvederi Murri, R. Zese, M. Alberti, G. Franchini, I. Domenicano, F. Folesani, C. Sorio, L. Benini, P. Carozza, J. Little, L. Grassi

Optimization of Accelerated Life Testing Cycle for an Traction Motor and Inverter System of Electric Vehicle

D. Ha*, T. Lee

On the use of manifold learning tools for coherent object interpolation based on geometrical and topological descriptors

D. Muñoz, O. Allix, F. Chinesta, **J. Ródenas***, E. Nadal

Wed, 31/05/2023 16:15 - 18:15

Salone Giardino 1

IS11b - - Advanced computational mechanics in real-world applications

Chaired by: Michele Girifoglio (SISSA, Trieste)

Membrane Characterization via Fractal Dimension Analysis

A. Jahangiri, **M. Mohammadi Amin***

Elastodynamic Contact Problems by Energetic Boundary Element Method

A. Aimi, **G. Di Credico***, H. Gimperlein

Modeling Viscoelastic Creep in Wood Polymer Composites Using Power Law Model in ABAQUS

J. Kovacicova*, S. Ahmed, M. Kroon, S. Adamopoulos

Importance of Consideration of the Plastic Anisotropy of Light-Weight Aluminum Alloys: Invariant-based Formulation and its Identification using Mechanical and Virtual Tests

O. Cazacu*, B. Revil-Baudard

Application of the Geometrically Exact Intrinsic Beam Model on Rotor Blades

C. Bleffert*, L. Dreyer, M. Röhrig-Zöllner

Wed, 31/05/2023 16:15 - 18:15

Salone Giardino 2

IS08b - - Mathematical software for Computational and Data Science at Extreme scales

Chaired by: Salvatore Filippone (Università di Roma "Tor Vergata")

Multi GPU Codes For Ising Quantum Spin Glass Simulations

M. Bernaschi*, I. González-Adalid Pemartin, V. Martin-Mayor, G. Parisi

Fast multiresolution covariance analysis

D. Baroli, H. Harbrecht, **M. Multerer***

HPC Hybrid CPU-GPU Geomechanical Simulator for Coupled Basin Models at Extreme-Scale

G. Scrofani, C. Janna, G. Isotton, **A. Filippini***

Algebraic parallel linelet preconditioner for incompressible flow solvers

R. de Olazábal*, O. Lehmkuhl, R. Borrell

PSCTOOLKIT: Parallel Sparse Computation Toolkit

P. D'Ambra, **F. Durastante***, S. Filippone

Wed, 31/05/2023 16:15 - 18:15

Salone Giardino 3

IS04b - - Numerical methods for coupled problems in geometrically complex domains

Chaired by: Francesco Ballarin (Università Cattolica del Sacro Cuore, Brescia)

Virtual Element Methods for large-scale simulations of complex models or in complex geometries: polytopal mesh adaptivity, stabilization-free virtual elements and geophysical applications

S. Berrone*, A. Borio, A. D'Auria, F. Marcon, F. Vicini, S. Scialò

A Two-Level Galerkin Reduced Order Model for the Steady Navier-Stokes Equations

D. Park, C. Mou, H. Liu, A. Sandu, **T. Iliescu***

An Upscaled Darcy-Brinkman-Navier-Stokes Model

H. Tràn*, S. Pop, J. Schütz

A numerical model based on moving mesh technique for nano-filled ultra-high-performance fiber-reinforced concrete structures

D. AMMENDOLEA*, F. GRECO, L. Leonetti, P. LONETTI, A. Pascuzzo

Two-Phase flow simulations in complex fracture networks with a Virtual Element approach

S. Berrone, M. Busetto, **F. Vicini***

Wed, 31/05/2023 16:15 - 18:15

Salone Giardino 4

IS18a - - Recent mathematical advances regarding industrial problems in fluid mechanics

Chaired by: Ridgway Scott (University of Chicago)

Numerical Approximation of Oldroyd-B Fluids Keynote

N. Walkington*

A New Method for Grade-two Fluids

S. Pollock*, R. Scott

MESHFREE for Industrial Applications : A General Continuum Mechanics Approach

C. Sanghavi*, I. Michel, J. Kuhnert

Numerical Methods for Incompressible Multiphase Magnetohydrodynamics and Applications to Liquid Metal Batteries

L. Cappanera*

Wed, 31/05/2023 16:15 - 18:15

Sala Belvedere

IS09b - - Advanced numerical methods for predictive digital twins

Chaired by: Mengwu Guo (University of Twente)

An efficient computational framework for predictive digital twins in structural health monitoring

M. Torzoni, M. Tezzele, S. Mariani, **A. Manzoni***, K. Willcox

Deep learning of coupled dissipative systems

Q. Hernández*, A. Badías, F. Chinesta, E. Cueto

Cell to Whole Organ Global Sensitivity Analysis on a Four-chamber Electromechanics Model

M. Strocchi*, S. Longobardi, C. Augustin, M. Gsell, C. Rinaldi, E. Vigmond, G. Plank, C. Oates, R. Wilkinson, S. Niederer

Deep Kernel Learning of Dynamical Models from High-Dimensional and Noisy Data

N. Botteghi*, M. Guo, C. Brune

Multiscale Process Modelling Analysis for Digital Twin and prediction of Composite Strength Allowables

G. Odegard*, M. Maiaru

Wed, 31/05/2023 18:15 - 19:15

Salone Giardino 1

IS11c - - Advanced computational mechanics in real-world applications

Chaired by: Michele Girfoglio (SISSA, Trieste)

Advanced computational design of complex nanostructured photonic devices using high order discontinuous Galerkin methods and statistical learning global optimization

M. Elsawy, A. Gobé, **S. Lanteri***, G. Leroy, C. Scheid

A Reduced Order Approach for Artificial Neural Networks applied to Object Recognition

L. Meneghetti*, N. Demo, G. Rozza

Adaptive mesh refinement in cgDG for scattering problems

H. Navarro-García*, P. Díez, J. Navarro-Jiménez, A. Huerta, J. Ródenas, E. Nadal

Wed, 31/05/2023 18:15 - 19:15

Salone Giardino 2

IS07 - - Mathematical souls of digital twins: the frontiers of adaptive modelling for vehicle development, operations, and maintenance

Chaired by: Dr. Laura Mainini (Politecnico di Torino), Dr. Matteo Díez (CNR-INM)

Multifidelity Reduced Order Models of Flow Systems Involving Geometric Parameters

A. Huerta*, A. Borrás, R. Perelló-Ribas, M. Giacomini

Data-driven nowcasting of pedestrian and vehicle traffic volumes for the digital twin of the city of Matera

R. Pellegrini*, M. Díez

On Non-Uniqueness of Digital Twins

M. Díez, **L. Mainini***

Wed, 31/05/2023 18:15 - 19:15

Salone Giardino 4

IS18b - - Recent mathematical advances regarding industrial problems in fluid mechanics

Chaired by: Sara Pollock (University of Florida)

Advances in Flight Simulation and Flow Instability

R. Scott*

Comparing the Size of Finite Element Spaces in 3D for Fluid Equations

R. Scott, **T. Tschierpel***

Modelling moving contact lines on elastic sheets

W. Ren*

Numerical Modelling of Ammonia Combustion Enhancement By Plasma, Hydrogen, and O₂-Enriched Air

M. Shahsavari*, M. Jangi

Wed, 31/05/2023 20:30 - 23:00

Hotel Diodoro

Conference Dinner

Thursday, 01/06/2023

Thu, 01/06/2023 09:00 - 10:00

Salone Congressi

EV3 - - Event 3 - Quantum computing for fluids: where do we stand?

Sauro Succi (Italian Institute of Technology, Genoa and Harvard University)

Thu, 01/06/2023 10:00 - 10:45

Salone Congressi

EV4 - - Event 4 - How to effectively pitch your disruptive ideas?

Maurizio La Cava (MLC Presentation Design, Milano)

Thu, 01/06/2023 10:45 - 11:15

Coffee Break

Thu, 01/06/2023 11:15 - 13:15

Salone Congressi

IS06a - - Fast scientific computing and numerical simulation for industry

Chaired by: Mr. Nicola Demo (FAST Computing Srl, Trieste)

ARGOS: The Computational Web Platform for Fast Simulation

N. Demo*, A. Martini, G. Rozza

Challenges of Residual Minimization-based Model Order Reduction in Car Aerodynamics

M. Mrosek, A. Scardigli, C. Othmer, **H. Telib***

Solving fluid flow problems over complex 3D geometries using the RBF-FD Meshless Method and Algebraic Multigrid

K. Chandrasekar Jeyanthi*, M. Munerato, D. Miotti, R. Zamolo, E. Nobile

A POD-Neural Network Model for Molten Glass Flow

E. Delgado Avila, **A. Mola***, G. Rozza

PADME-AM: Partition of Unity Methods for Additive Manufacturing

S. Elswesijer*, J. Holke, P. Ponnusamy, M. Schweitzer, L. Troska

Projection-based model order reduction for multi-modelling problems in nonlinear structural mechanics

E. Agouzal*, J. Argaud, M. Bergmann, G. Ferté, T. Taddei

Thu, 01/06/2023 11:15 - 13:15

Salone Giardino 1

IS13a - - Physics informed machine learning for scientific applications

Chaired by: Dr. Massimiliano Lupo Pasini (Oak Ridge National Laboratory)

Graph Neural Networks Motivated By PDE's [Keynote](#)

E. Haber*

Physics-Informed Machine Learning for Proper Orthogonal Decomposition (POD) based Reduced-Order Modelling (ROM) of Parametric, Partial Differential Equations (PDEs)

H. Dave*, L. Cotteleer, A. Parente

Physics-Informed Neural Networks With Hard Constraints for Solid and Contact Mechanics

T. Sahin*, M. von Danwitz, A. Popp

Physics-Informed Neural Networks for Granular Flows Modelling

Y. Cheny*, M. Delcey, S. Kiesgen de Richter, J. Keck

Physics Informed Neural Networks for Gravity Currents Reconstruction from Limited Data

M. Delcey*, Y. Cheny, S. Kiesgen De Richter

Thu, 01/06/2023 11:15 - 13:15

Salone Giardino 2

IS22a - - Advances in modeling and simulation of biological systems

Chaired by: Raffaella De Vita (Virginia Tech, Blacksburg)

Computational Models of Human Pregnancy Based on Maternal Anatomy And Cervical Stiffness for Preterm Birth Prediction

E. Louwagie, J. Hairston, M. Mourad, **K. Myers***

Patient-specific treatment for fracture healing processes based on structural analyses

A. Martinez-Martinez*, E. Nadal, D. Bonete-Lluch, J. Ródenas, O. Allix

Active Elastic Instabilities in Gel Bodies with Small Cavities

M. Curatolo, **P. Nardinocchi***, L. Teresi

Elastic membranes spanning deformable boundaries

F. Ballarin*, G. Bevilacqua, L. Lussardi, A. Marzocchi

Thu, 01/06/2023 11:15 - 13:15

Salone Giardino 3

IS12a - - Computational Medicine: Data-driven and physics-based tools for clinical applications

Chaired by: Marina Strocchi (King's College London), Stefano Pagani (Politecnico di Milano)

Computational Models of Cardiac Electro-mechanical Function – Closing the Gaps between Virtual and Physical Reality

G. Plank*, K. Gillette, C. Augustin

Impact of Catheter Tip Shape in Cardiac Ablation

A. Petras*, Z. Moreno Weidmann, M. Echeverria Ferrero, M. Leoni, J. Guerra, L. Gerardo-Giorda

Sensitivity Analysis of Electrode Location on ECG Signals

L. Ciccì*, S. Qian, C. Rodero, F. Campos, K. Gillette, G. Plank, M. Bishop, S. Niederer

Robust preconditioned solvers for cardiac electrical models

N. Huynh*

Identification of vital parameters during cardiopulmonary resuscitation

W. Kern*, S. Orlob, A. Bohn, W. Toller, J. Gräsner, J. Wnent, M. Höller

A bridge between cardiac fibers and liquid crystals

N. Barnafi*

Thu, 01/06/2023 11:15 - 13:15

Salone Giardino 4

IS24 - - Mathematical modeling and causal inference applied to industrial and societal problems

Chaired by: Hiroshi Suito (Tohoku University)

Enhancing Explainability of Causal Discovery to Accelerate Materials Design Keynote

H. Higuchi*, K. Fujita, H. Suzuki, T. Asai, S. Fukuta

Exploring the Diversity of Gene Regulatory Networks to Uncover Novel Insights

K. Maruhashi*, Y. Koyanagi, T. Asai, K. Uemura, S. Chang, Y. Fujishige, A. Fujii

Predicting Real World Dynamics on Infrastructure Networks Based on Reservoir Computing

H. Ando*

A Matching Algorithm for Incomplete Trees for Diagnosis of Bronchiectasis

H. Suito*, J. Tominaga

Construction for Incomplete Map Matching Based on Local and Global Geometries

T. Akamatsu, G. Gress*, K. Huneycutt, M. Kanazawa, S. Kano, S. Omura

Thu, 01/06/2023 11:15 - 13:15

Sala Belvedere

IS23a - - Numerical modelling for sustainable innovation

Chaired by: Raffaele D'Ambrosio (University of L'Aquila)

Pharma Tender Processes: Modeling Auction Outcomes

P. Mekler*, J. Sun

Limited Commercial Licensing Strategies: A Piecewise Deterministic Differential Game

J. Canci*, D. De Giovanni

From Concrete Mixture to Structural Design - An Optimization Framework to Reduce the Global Warming Potential

E. Tamsen*, A. Agrawal, P. Koutsourelakis, J. Unger

A New Adaptive Image Format for Machine Learning Classification

N. Ferro, L. Liverotti*, M. Matteucci, S. Perotto

On the Numerical Solution of Corrosion Models

A. Cardone, D. Conte, G. Frasca-Caccia*

Thu, 01/06/2023 13:15 - 14:30

Lunch Break

Thu, 01/06/2023 14:30 - 16:30

Salone Congressi

IS06b - - Fast scientific computing and numerical simulation for industry

Chaired by: Mr. Nicola Demo (FAST Computing Srl, Trieste)

Real Time Reduced Order Modelling in Computational Mechanics: State of the Art and Challenges

G. Rozza*

Extreme mesh deformation (X-MESH): A new paradigm to follow physical interfaces, application to the Stefan phase-change model

N. Moes*, J. Remacle, J. Lambrechts, B. Le, N. Chevaugeon

Projection-based Reduced Order Modeling in Non-Linear Statics: Results from the Implementation in Abaqus

O. Bettinotti*, V. Oancea, R. Taylor

Exascale multiphysics simulator platform for CO2 sequestration and monitoring: A successful collaboration between Industry and academic research

H. Calandra*

DT4DRYER: A tool to optimize the drying process

L. Royo-Pascual*, E. Gimeno, A. González-Cencerrado, C. Montañés, A. Gómez, P. Talasila, P. Larsen

Modeling of the Selective Laser Melting Process with the Use of the Lattice Boltzmann Method

D. Svyetlichnyy*

Thu, 01/06/2023 14:30 - 15:30

Salone Giardino 1

IS13b - - Physics informed machine learning for scientific applications

Chaired by: Dr. Massimiliano Lupo Pasini (Oak Ridge National Laboratory)

Graph neural networks prediction of spectral properties of organic molecules

M. Lupo Pasini*, P. Zhang, S. Irle, Y. Cheng

Physics-informed Neural Network with Fourier Features for Particle Radiation Transport

J. Ragusa*, Q. Huhn

Thu, 01/06/2023 14:30 - 15:30

Salone Giardino 2

IS22b - - Advances in modeling and simulation of biological systems

Chaired by: Raffaella De Vita (Virginia Tech, Blacksburg)

Simulating Multiscale Cellular Models with CellularPotts.jl

R. Gregg*

A Combined Statistical Shape and Finite Element Modelling Approach for the Robust Assessment of the Female Pelvic Floor Muscles and Bony Pelvis

M. Routzong*

Approximate Deconvolution Leray Reduced Order Model

A. Sanfilippo*, F. Ballarin, I. Moore, T. Iliescu

Thu, 01/06/2023 14:30 - 16:30

Salone Giardino 3

IS12b - - Computational Medicine: Data-driven and physic-based tools for clinical applications

Chaired by: Dr. Federica Caforio (University of Graz), Dr. Francesco Regazzoni (Politecnico di Milano)

Δ -PINN: Physics-Informed Neural Networks on Complex Geometries

S. Pezzuto*, F. Sahli Costabal, P. Perdikaris

Training Gives Me PINNs and Needles - On the Complexity of Training Physics-Informed Neural Networks

F. Rohrhofer*, S. Steger, S. Posch, C. Gößnitzer, B. Geiger

Learning Reduced-Order Models for Cardiovascular Simulations with Graph Neural Networks

L. Pegolotti*, M. Pfäller, N. Rubio, K. Ding, R. Brugorolas Brufau, E. Darve, A. Marsden

Parametric PDEs solvers, uncertainty quantification and parameter estimation

S. Riffaud*, D. Lombardi, M. Fernandez

Machine Learning-Based Method for Structural Characterization and Fracture Risk Evaluation of Vertebrae With Metastasis.

B. Gandia-Vañó*, X. Garcia-Andrés, E. Arana, E. Nadal-Soriano, J. Ródenas-García

Level-set geometry parametrization and kernel optimization for predictions of thrombectomy outcomes

S. Bridio*, G. Luraghi, F. Migliavacca, D. González, P. Díez, J. Rodriguez Matas, A. García-González

Thu, 01/06/2023 14:30 - 16:30

Salone Giardino 4

IS33 - - Mesh processing and applications

Chaired by: Charles Dapogny (CNRS, Laboratoire Jean Kuntzmann, Université Grenoble Alpes, Saint Martin d'Hères)

t8code - The Scalable and Efficient Alternative to Unstructured Meshes

J. Holke, C. Burstedde, D. Knapp, **L. Dreyer***

Valid Meshing via Alpha Wrapping

P. Alliez*

A new approach for two-phase flows simulation: X-Mesh

J. Remacle*

High-Fidelity Simulations Of Interfacial Two-Phase Flows On Adaptive Unstructured Grids

V. Moureau*, F. Pecquery, J. Carmona, P. Bénard, G. Lartigue, M. Cailler, J. Leparoux, R. Mercier

Mesh adaptation techniques for turbulent flows

E. Temellini*, S. Perotto, N. Ferro, T. Chacon Rebollo, E. Delgado Avila

Thu, 01/06/2023 14:30 - 15:30

Sala Belvedere

IS23b - - Numerical modelling for sustainable innovation

Chaired by: Prof. Dimitri Breda (University of Udine (DMIF))

Bistability in stochastic networks dynamics

S. Di Giovacchino*, D. Higham, K. Zygalakis

Adapted Numerical Methods for Reaction-Diffusion Problems in Sustainability

D. Conte*, G. Pagano, B. Paternoster, J. Martin Vaquero

Numerical Modelling for Supply Chains

R. D'Ambrosio*, C. Scalone

Thu, 01/06/2023 15:30 - 16:30

Salone Giardino 1

IS26a - - High performance computing in research and industry

Space-Time Discretizations and Their Potential for High-Performance Computing

M. Behr*

Nonlinear Reduced-Order Modelling for Three-Dimensional Turbulent Flow around Complex Geometry using Large-Scale Distributed Machine Learning

K. Ando*, R. Bale, A. Kuroda, M. Tsubokura

Ice Sheet Modelling - Improving Efficiency of High Accuracy Models

J. Ahlkrona*, A. Löfgren, C. Helanow, T. Zwinger

Thu, 01/06/2023 15:30 - 16:30

Salone Giardino 2

IS14a - - The role of data-driven modelling in sustainable energy technologies

Chaired by: Prof. Alessandro Parente (Université Libre de Bruxelles)

Reconstruction and Forecasting of a turbulent velocity flow field through Autoencoders and Singular Value Decomposition

R. Abadia-Heredia*, M. Crialesi-Esposito, M. Lopez-Martin, L. Brandt, S. Le Clainche

Reinforced (Model) Predictive Control of a wind-turbine: a proof-of-concept

L. Schena*, T. Verstraeten, W. Munters, J. Helsen, M. Mendez

Active Flow Control on three-dimensional cylinders through Deep Reinforcement Learning

P. Suárez*, F. Alcántara-Ávila, A. Miró, J. Rabault, B. Font, O. Lehmkhul, R. Vinuesa

Thu, 01/06/2023 15:30 - 16:30

Sala Belvedere

IS32a - - Advances and computational challenges in the integration of Additive Manufacturing and Topology Optimization

Chaired by: Dr. Federico Ferrari (Technical University of Denmark)

Shape optimization of a layer by layer mechanical functional for dealing with overhang constraints Keynote

G. Allaire, **C. Dapogny***, R. Estevez, A. Faure, G. Michailidis

Density derivatives for overhang constraints in multiresolution topology optimization

F. Mezzadri*

Thu, 01/06/2023 16:30 - 17:00

Coffee Break

Thu, 01/06/2023 17:00 - 19:00

Salone Congressi

IS10 - - Physics- and data-driven modelling for digital-twin technologies

Chaired by: Vasileios Tsiolakis (NTNU, Trondheim)

Reduced Order Modelling (ROM) and Hybrid Analysis and Modelling (HAM) as Enablers for Predictive Digital Twins (DT) **Keynote**

T. Kvamsdal*, E. Fonn, A. Rasheed, V. Tsiolakis, H. van Brummelen

A Thermodynamics-Informed Deep Learning Framework for Resolution Augmentation

C. Bermejo Barbanaj*, B. Moya García, A. Badiás Herbera, F. Chinesta Soria, E. Cueto Prendes

Dimensionality Reduction for Pollutant Forecasting on a Real Urban Area Test Case

C. Nixarlidis*, L. Cotteleer, A. Gambale, T. De Troyer, A. Parente

Physics-Aware Soft-Sensors for Embedded Digital Twins

E. Chinellato, P. Martin, S. Pierobon, L. Rinaldi, G. Giusteri, **F. Marcuzzi***

Determination of remaining useful life by fusion of physical- and data-driven modeling

E. Öztürk, **B. Ott***

Thu, 01/06/2023 17:00 - 19:00

Salone Giardino 1

IS26b - - High performance computing in research and industry

Chaired by: Johan Hoffman (KTH Royal Institute of Technology, Stockholm)

Toward High-Performance Multi-Physics Coupled Simulations for the Industry with XDEM

X. Besseron*, P. Adhav, D. Louw, B. Peters

Enabling Algebraic Multigrid for HPC industrial applications

B. Metsch*

Neko: A Modern, Portable, and Scalable Framework for High-Fidelity Computational Fluid Dynamics

N. Jansson*, M. Karp, S. Markidis, P. Schlatter

Numerical Modelling of the Performance of a Cross-Flow Gas Mixer for a Partial Oxidation Reactor

M. Klevs*, V. Geza, V. Kharitonov, G. Zageris, A. Jakovics

Thu, 01/06/2023 17:00 - 19:00

Salone Giardino 2

IS14b - - The role of data-driven modelling in sustainable energy technologies

Chaired by: Prof. Alessandro Parente (Université Libre de Bruxelles)

A Reinforcement Learning Based Shock Capturing Approach for the High-Order Discontinuous Galerkin Method

A. Schwarz*, J. Keim, L. Zech, A. Beck

Multi-objective training of an algebraic heat flux model to cure model-data inconsistencies in the momentum treatment

E. Saccaggi, **M. Fiore***, L. Koloszar, M. Mendez

Comparative assessment of optimization algorithms for kinetic model optimization

T. Dinelli*, A. Stagni

Neural Network for Chemistry Closure and the Effect of Manifold Decomposition

T. Karpowski*, F. Ferraro, A. Scholtissek, C. Hasse

A-posteriori Investigation of a Data-Driven Scale-Similarity Super-Resolution Model for Turbulence Closure Modeling

L. Nista*, F. Froede, T. Grenga, J. MacArt, A. Attili, H. Pitsch

Adaptive, Physics-based Digital Twins of Practical Combustion Systems

A. Procacci*, L. Donato, C. Galletti, A. Coussement, A. Parente

Thu, 01/06/2023 17:00 - 19:00

Salone Giardino 3

IS12c - - Computational Medicine: Data-driven and physics-based tools for clinical applications

Chaired by: Marina Stocchi (King's College London), Dr. Elias Karabelas (University of Graz)

Preliminary clinical validations of a digital twin model based on multi-scale, multi-fidelity computational model of the human physiology

C. Contarino*, F. Chifari, P. Severgnini, G. Feliciotti, E. Castelnuovo, C. Zanovello

Hemodynamics in Stented Arteries: a Reduced Order Model

A. Ranno*, F. Lespagnol, F. Ballarin, M. Behr, S. Perotto, P. Zunino

Blood velocity reconstruction in coronary artery with occlusion using particle tracking data

H. Keramati*, A. de Vecchi, S. Niederer

Mathematical Background for Upper Limb Exoskeleton

M. Leba*, A. Ionica

Image-based bone remodelling model adaptation based on the mechanostat theory

E. Nadal*, J. Gutiérrez-Gil, C. Atienza, M. Tur, J. Ródenas

Bone microstructure estimation from medical images through structural and mechanosensory based procedures

J. Gutiérrez-Gil*, M. Bosch-Galera, Y. Kameo, E. Nadal, T. Adachi, M. Tur, J. Ródenas

Thu, 01/06/2023 17:00 - 19:00

Salone Giardino 4

IS25 - - Model Reduction, Calibration and Optimal Control for Plasmas

Chaired by: Francesca Rapetti (Universite Cote d'Azur)

Identification of the plasma current density in a Tokamak

J. Blum*, C. Boulbe, B. Faugeras

Nonlinear compressive reduced basis approximation for PDE's

A. Cohen, C. Farhat, **Y. Maday***, A. Somacal

2D turbulent transport model reduction for magnetic fusion plasma

E. Serre*, H. Bufferand, G. Ciraolo, P. Ghendrih, P. Tamain

Parameter Identification for Turbulent Transport of Fusion Plasmas

L. Iamerand*, F. Rapetti, D. Auroux

Reduced order modeling using auto-encoder and Hamiltonian neural networks

E. Franck, **G. Steimer***, L. Navoret, V. Vigon

Geometric Numerical Methods and Machine Learning for Highly-Oscillatory Problems

L. Tremant*

Equilibrium reconstruction in Tokamaks using neural networks

G. Gros*, C. Boulbe, B. Faugeras

Thu, 01/06/2023 17:00 - 19:00

Sala Belvedere

IS32b - - Advances and computational challenges in the integration of Additive Manufacturing and Topology

Optimization

Chaired by: Stefania Marconi (University of Pavia)

Optimizing and generating multiscale lattice structures through evolutionary, machine learning methods and variational auto encoders

F. Dos Reis*, N. Karathanasopoulos

Level set-based topology optimization of structures enhanced by anisotropic graded meshes

D. Cortellessa, N. Ferro, **S. Micheletti***, S. Perotto

Topology Optimization Method with Physics-based Overheating Control

R. Ranjan, **C. Ayas***, M. Langelaar

Structural and Fluidic Analysis of Vertical Stabilizers with Co-Cured Metal-Composite Joints

F. Portis*, G. De Pasquale

Free-form material extrusion filament path optimization and the related orientation-field based algorithm

V. Murugan, **G. Alaimo***, F. Auricchio, S. Marconi

Thu, 01/06/2023 19:00 - 19:15

Closure Ceremony