

**IMACS2023**

Monday 09/11/2023

**PLENARY ROOM #38**

**11:30 – OPENING**

*Carlo Massimo Casciola*, Dean of the Civil and Industrial Engineering Faculty of the University 'La Sapienza of Rome

*Emilio Fortunato Campana*, Director of the Department of Engineering, ICT and Energy and Transport Technologies (DIITET) of the National Research Council (CNR)

*Roberto Natalini*, Director of the Institute for the Applications of Computing (IAC) of CNR

*Rosa Maria Spitaleri*, President of IMACS and Chair of *IMACS2023*

*Thiab Taha*, vice-President of IMACS and co-Chair of *IMACS2023*

**12:00 - KEYNOTE LECTURE**

Chair: *Rosa Maria Spitaleri*

Approximation of Non Linear Hyperbolic Problems and Property of Conservation  
*Remi Abgrall*

**12:45 - KEYNOTE LECTURE**

Chair: *Ezio Venturino*

Forecasting Damage and Consolidation: Mathematical Models of Reacting Flows in Monumental Stones  
*Roberto Natalini*

**13:30 - LUNCH TIME**

**IMACS2023**

Monday 09/11/2023

**PLENARY ROOM #38**

**15:00 - SS8**

NEW TRENDS IN PHASE FIELD: THEORY AND APPLICATIONS

Organizers: *Mejdi Azaiez, Chuanju Xu*

15:00 - Nonlocal Cahn-Hilliard type Model for Image Inpainting  
*Mejdi Azaiez*

15:20 - Monte Carlo fPINNs: Deep learning method for forward and inverse problems involving high dimensional fractional partial differential equations  
*Ling Guo*

15:40 - A diffuse domain method for solving PDEs in complex geometries  
*Zhenlin Guo*

16:00 - A unified design of nonuniform energy stable schemes for time fractional gradient flows and nonlinear integro-differential equations  
*Ren-jun Qi, Xuan Zhao*

16:20 - On operator splitting methods for phase-field equations  
*Chaoyu Quan*

16:40 - Gradient flow models: modeling and numerical methods  
*Chuanju Xu*

17:00 Numerical modelling and optimization for Thermal Energy Storage  
*Hui Yao*

**17:20 - SS12**

RECENT ADVANCES IN LATTICE BOLTZMANN METHODS

Organizer: *Ralf Deiterding*

17:20 - Non-Cartesian Lattice Boltzmann Methods with Structured Adaptive Mesh Refinement  
*Ralf Deiterding, Juan Antonio Reyes Barraza*

17:40 - Lightweight Lattice Boltzmann  
*Marco Lauricella*

**15:00 – SS4**

GRAPHICAL MODELS FOR LIFE SCIENCE

Organizers: *Claudia Angelini, Daniela De Canditiis, Italia De Feis*

15:00 - Valid and Exact Two-sample Permutation Tests for Network Data  
*Cesare Miglioli, Stéphane Guerrier, Maria-Pia Victoria-Feser*

15:20 - Structure Learning of Graphical Models for Count Data, with Applications to Single-cell RNA Sequencing  
*Thi Kim Hue Nguyen, Koen Van Den Berge, Monica Chiogna, Davide Risso*

15:40 - Structure Learning of Coloured Gaussian Graphical Models for Paired Data  
*Alberto Roverato, Saverio Ranciat*

16:00 - Empowering Propensity Score Estimation through a Bayesian Network approach  
*Paola Vicard, Federica Cugnata, Paola M.V. Rancoita, Pier Luigi Conti, Alberto Briganti, Clelia Di Serio, Fulvia Mecatti*

16:20 - Random Graphical Model of Microbiome Interactions in Related Environments  
*Veronica Vinciotti, Ernst Wit, Francisco Richter*

**16:40 – General Session (1)**Chair: *Mapundi Kondwani Banda*

16:40 - Numerical approximations for some fractional stochastic partial differential equations-cases of nonlinear heat and Burgers equations  
*Zineb Arab, Latifa Debbi*

17:00 - An Analysis of Boundary Perturbations in Laplace-Steklov Eigenvalue Problems  
*Eylem Bahadır, Önder Türk*

17:20 - Analysing the Well-posedness of Networked first-order Hyperbolic Systems of Fluid Flow  
*Mapundi Kondwani Banda*

17:40 - Deep Image Prior Based Segmentation for Noisy Images  
*Alessandro Benfenati, Ambra Catozzi, Giorgia Franchini, Federica Porta*

**15:00 – SS14**

USING BLOCK METHODS FOR SOLVING DIFFERENTIAL PROBLEMS

Organizer: Higinio Ramos

15:00 - Valid and Exact Two-sample Permutation Tests for Network Data  
Adaptive stepsize optimized three-step hybrid block method for first-order initial value problems

*Aderogba Adebayo, Higinio Ramos*

15:20 - An Optimized Algorithm for Numerical Solution of Coupled Burgers Equations

*Anurag Kaur, V. Kanwar, Higinio Ramos*

15:40 - The Semi-implicit EM Method for Nonlinear Non-autonomous SDEs Driven by a Class of Levy Processes

*Xiaotong Li, Wei Liu, Hongjiong Tian*

16:00 - Block  $\theta$ -methods for DAEs and DDAEs

*Xiaotong Li, Zhongli Liu, Haiyan Yuan, Hongjiong Tian*

16:20 - A New Block Method for Direct Integration of Third-order BVPs

*Mufutau Ajani Rufai, Bruno Carpentieri, Higinio Ramos*

**16:40 – SS1**

BIOMEDICINE MEETS NUMERICS: ADVANCED NUMERICAL METHODS FOR NEW CHALLENGES

Organizers: *Cristina Campi, Francesca Pitolli*

16:40 - Mathematical Methods in Medicine

*Cristina Campi, Isabella Cama, Valentina Candiani*

17:00 - A new TPS for FLASH VHEE beams: the implementation of quantum based algorithms

*Angelica De Gregorio, Daniele Carlotti, Gaia Franciosini, Michela Marafini, Annalisa Muscato, Alessio Sarti, Angelo Schiavi, Marco Toppi, Giacomo Traini, Antonio Trigilio, Vincenzo Patera*

17:20 - An in-vivo comparison of Electrophysiological Source Imaging methods

*Annalisa Pascarella, Ezequiel Mikulan, Federica Sciacchitano, Simone Sarasso, Annalisa Rubino, Ivana Sartori, Francesco Cardinale, Flavia Zauli, Pietro Avanzini, Lino Nobili, Andrea Pigorini, Alberto Sorrentino*

17:40 - Advanced Computer Vision Techniques for Drug Abuse Detection

*Giulia Tufo, Meriam Zribi, Francesca Pitolli*

**15:00 – SS11**

RECENT ADVANCES IN DATA SCIENCE. COMPUTATIONAL ASPECTS AND APPLICATIONS

Organizer: *Christian Acal*

15:00 - Function-on-function PLS regression: a penalized approach

*M. Carmen Aguilera-Morillo, Harold A. Hernandez-Roig, Ana M. Aguilera, Cristian Preda*

15:20 - Robust Estimation and Testing for Step-stress Experiments under Interval Censoring

*Narayanaswamy Balakrishnan, María Jaenada, Leandro Pardo*

15:40 - A Spatial Functional Regression Approach from Correlated Curves in Space

*Felicita Doris Miranda Huaynalaya, Maria Dolores Ruiz Medina*

16:00 - How to Model a Complex System Subject to Multiple Events and a Vacation Policy in a Matrix-computational Form. MMAPs

*Juan Eloy Ruiz-Castro, Hugo Alaín Zapata-Ceballos*

16:20 - Wavelet-based Sparse Optimization via Fixed-point Iteration Scheme in High-dimensional Data Analysis

*Marc Vidal, Ana M. Aguilera***16:40 – MS7**

NUMERICAL METHODS FOR FRACTIONAL-DERIVATIVE DIFFERENTIAL EQUATIONS

Organizers: *Roberto Garrappa, Martin Stynes*

16:40 - A Rational Preconditioner for Multi-dimensional Riesz Fractional Diffusion Equations

*Lidia Aceto, Mariarosa Mazza*

17:00 - Numerical Solution of Random Fractional Laguerre-type Differential Equations via Moments and Density

*Clara Burgos Simón, Juan Carlos Cortés López, Laura Villafuerte Altúzar, Rafael J. Vilanueva Micó*

17:20 - Two Kinds of Numerical Algorithms for Ultra-slow Diffusion Equations

*Min Cai, Changpin Li, Yu Wang*

17:40 - A Computational Approach for Variable-order Fractional Differential Equations

*Roberto Garrappa, Andrea Giusti*

**IMACS2023**

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**Chiostro**

**18:00 – POSTER SESSION**

Chair: *Bharat K. Soni*

Randomized GSVD based regularization for the inverse problem of ultrasound tomography

*Anita Carević, Mohamed Almekkawy*

Approximating inter-arrival distribution by phase type distribution.  
Asymmetric kernel method

*Yasmina Djabali*

Observer-based Dissipativity of Parabolic Systems with Multiple Actuators and Time Delays

*Ragul Ravi, Kalidass Mathiyalagan, Ju H. Pa*

**9:00 - KEYNOTE LECTURE**

Chair: *Laura Gardini*

Mathematical Modeling of Oncological Data - A Multi-scale Perspective

*Michele Piana*

**9:45 - GUEST LECTURE**

Chair: *Rosa Maria Spitaleri*

Research Integrity & Publishing Ethics: A whistlestop tour of common ethical pitfalls by well-intentioned researchers

*Darren Sugrue*

**10:20 – SS9**

NONLINEAR DYNAMICS FOR ECONOMICS, FINANCE AND SOCIAL SCIENCES

Organizer: *Fabio Tramontana*

10:20 - On the Statistical Significance of Quantile Connectedness Indexes

*Bonaccolto Giovanni, Massimiliano Caporin, Jawad Syed Shahzad*

10:40 - A Discontinuous Model of Exchange Rate Dynamics with Sentiment Traders

*Giovanni Campisi, Anastasiia Panchuk, Fabio Tramontana*

**11:00 – COFFEE BREAK****11:30 – MS9**

RECENT PROBLEMS AND METHODS IN COMPUTATIONAL FINANCE

Organizers: *Karel in't Hout, Carlos Vázquez Cendón*

11:30 - Identifying the Number of Latent Factors of Stochastic Volatility Models

*Erindi Allaj, Maria Elvira Mancino, Simona Sanfelici*

11:50 - XVA Modelling and Computing in a Multicurrency Setting

*Inigo Arregui, Roberta Simonella, Carlos Vazquez*

12:10 - Efficient Likelihood Estimation with Wavelets

*Augusto Blanc-Blocquel, Luis Ortiz-Gracia, Rodolfo Oviedo*

12:30 - Impact of Correlation between Interest Rates and Mortality Rates on the Valuation of Various Life Insurance Products

*Griselda Deelstra, Pierre Devolder, Benjamin Roelants du Vivier*

12:50 - A Deep Solver for BSDEs with Jumps

*Alessandro Gnoatto, Marco Patacca, Athena Picarelli*

13:10 - Artificial Neural Networks with Chebyshev Polynomials

*Beatriz Gomez Martin, Victor Gatón Bustillo*

**13:30 - LUNCH TIME**

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**PLENARY ROOM #38**

**15:00 – KEYNOTE LECTURE**

Chair: *Francesca Pitolli*

Modeling Traffic Jam and Growth Process of Neurons Using IGA and PGNN  
*Jessica Zhang*

**16:00 – MS9**

16:00 - A New Deep Solution Algorithm for Fully Coupled FBSDEs  
*Zhipeng Huang*

16:20 - Efficient Numerical Valuation of European Options under the Two-asset Kou Jump-diffusion Model  
*Karel in 't Hout, Pieter Lamotte*

16:40 - Equilibrium Problems with Heterogeneous Agents under Jump-diffusion Models  
*Jonatan Ráfales, Carlos Vázquez*

**17:00 - COFFEE BREAK**

**17:30 – MS9**

17:30 - Approximate Option Pricing under Jump-diffusion Stochastic Volatility Models Based on a Hull and White Type Formula  
*Josep Vives*

**18:30 – APNUM & MATCOM Editors Meeting**



**10:20 – MS4**

MMSEP: MODELLING, METHODS AND SIMULATIONS FOR ENVIRONMENTAL PROBLEMS

Organizers: *Carmela Marangi, Andrea Scagliarini, Luca Sgheri, Isabella Torricollo*

10:20 - Pattern Formation Driven by Cross-diffusion in the Klausmeier-Gray-Scott Model

*Giuseppe Ali, Carmelo Scuro, Isabella Torricollo*

10:40 - Numerical Rock-Glacier Flow via the Pressure Method

*Elishan Christian Braun, Daniela Mansutti, Kumbakonam R. Rajagopal*

**11:00 – COFFEE BREAK****11:30 – MS4**

11:30 - Investigating spatial patterns in a model describing three-species interactions

*Maria Francesca Carfora, Isabella Torricollo*

11:50 - Retrieval of Surface and Atmospheric Parameters from High Resolution Infrared Sensors

*Italia De Feis, Fabio Della Rocca, Guido Masiello, Carmine Serio*

12:10 - The RothC Model: a Simple Tool for Simulating Soil Organic Carbon Dynamic

*Fasma Diele, Carmela Marangi*

12:30 - 2D model for seismic wave propagation in complex fractured domains

*Federica Di Michele, Pierangelo Marcati, Donato Pera, Bruno Rubino, Andriy Styahar*

12:50 - Multiscale modelling of soil bioremediation by multispecies biofilm

*Luigi Frunzo, Maria Rosaria Mattei, Ahmed Fathi*

13:10 - From Micro to Macro in the Physics and Ecology of Sea Ice

*Kenneth Morgan Golden*

**13:30 – LUNCH TIME**

**16:00 – MS4**

15:00 - Modelling Horizontal Gene Transfer of Plasmid-borne Resistance in Biofilms  
*Maria Rosaria Mattei, Julien Vincent, Alberto Tenore, Luigi Frunzo*

16:20 - On-off Intermittency in the Beddington-Free-Lawton Model  
*Angela Monti*

16:40 - Modelling sea ice and melt ponds evolution: sensitivity to microscale heat transfer mechanisms  
*Andrea Scagliarini, Enrico Calzavarini, Daniela Mansutti, Federico Toschi*

**17:00 COFFEE BREAK**

**17:30 – MS4**

17:30 - FORUM Sensitivity to Surface Emissivity  
*Cristina Sgattoni, Marco Ridolfi, Luca Sgheri, Chiara Zugarini*

17:50 - Building a Realistic Simulation of the Atmospheric State in Radiative Transfer  
*Luca Sgheri, Cristina Sgattoni, Chiara Zugarini*

**10:20 – MS3**

MATHEMATICAL AND NUMERICAL MODELLING OF POROUS MEDIA IN SUBSURFACE ENVIRONMENTS

Organizers: *Marco Berardi, Fabio Di Fonzo, Matteo Icardi, Mario Putti*

10:20 - A Preliminary Model for Optimal Control of Moisture Content in Unsaturated Soils

*Marco Berardi, Fabio Vito Difonzo, Roberto Guglielmi*

10:40 - Stabilized Explicit Methods for the Solution of a Vegetation Model

*Dajana Conte, Severiano González-Pinto, Domingo Hernández-Abreu, Beatrice Paternoster, María Soledad Pérez-Rodríguez*

**11:00 – COFFEE BREAK****11:30 – MS3**

11:30 - FLOWS: A Physically-Based Model to Simulate Water Flow and Solute Transport in the soil

*Antonio Coppola, Angelo Basile, Alessandro Comegna, Shawkat Basel Mostafa Hassan*

11:50 - Understanding the Effects of Irrigation with Different Treatment Reused Waters: a Machine Learning Approach

*Nicoletta Del Buono*

12:10 - A Macroscopic Model for Unsaturated Flow in Deformable Evolving Porous Media

*Matteo Icardi*

12:30 - Analytical and Numerical Solutions of Fractional Models in Porous Media

*Alessandra Jannelli, Maria Paola Speciale*

12:50 - A novel reduced-order model for advection-dominated problems based on Radon-Cumulative-Distribution Transform

*Tobias Long, Robert Barnett, Richard Jefferson-Loveday, Giovanni Stabile, Matteo Icardi*

13:10 - Numerical Simulation of a Compressible Gas Flow in Porous Media and Bioremediation

*Filippo Notarnicola*

**13:30 – LUNCH TIME**

**16:00 – MS11**

MS11 - RECENT TRENDS ON NUMERICS OF SINGULARLY PERTURBED DIFFERENTIAL EQUATIONS

Organizer: *Natesan Srinivasan*

16:00 - Fractal Quintic Spline Solutions for Singularly Perturbed Boundary-value Problems

*Balasubramani N, Guru Prem Prasad Mahalingam, Natesan Srinivasan*

16:20 - An Efficient Uniformly Convergent Method for Two Dimensional Parabolic Convection-diffusion Singularly Perturbed Systems

*Carmelo Clavero, Juan Carlos Jorge*

16:40 - Low-degree Robust Finite Element Scheme for Inhomogeneous Fourth Order Perturbation Problem

*Bin Dai, Huilan Zeng, Chen-song Zhang, Shuo Zhang*

**17:00 COFFEE BREAK****17:30 – MS11**

17:30 - Efficient Finite Element Method for 2D Parabolic Convection Diffusion Problems with Discontinuous Source Term

*Soundararajan Rajendran, Subburayan Veerassamy*

17:50 - Parameter-robust Numerical Analysis of a Numerical Scheme for a Parabolic Reaction-diffusion Equation with Time Delay Having Interior and Boundary Layers in its Solution

*S. Chandra Sekhara Rao, Abhay Kumar Chaturvedi*

**IMACS2023**

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**ROOM #5**

**10:20 – MS7**

NUMERICAL METHODS FOR FRACTIONAL-DERIVATIVE DIFFERENTIAL EQUATIONS

Organizers: *Roberto Garrappa, Martin Stynes*

10:20 - Numerical Approximation of a Differential Equation with a Riemann-Liouville-Caputo Fractional Derivative

*Jose Luis Gracia, Martin Stynes*

10:40 - Nonuniform Time-stepping Approximation Methods to Solve the Two-dimensional Time-fractional Diffusion-wave Equation

*Sarita Kumari, Rajesh K. Pandey*

**11:00 – COFFEE BREAK**

**11:30 – General Session (2)**

Chair: *Veronica Tora*

11:30 - Response Function for Linearized Saint-Venant Equations with Uniformly Distributed Lateral Inflow

*Swaroop Nandan Bora, Shiva Kandpal*

11:50 - Simulating how Climate Change Affects Cultural Heritage Deterioration

*Gabriella Bretti, Maurizio Ceseri*

12:10 - Numerical Solutions of the Velocity–Vorticity Formulation of the Navier–Stokes Equations by Using the Localized Ghost Point Method

*Chung-Lin Chu, Chia-Ming Fan*

12:30 - Steady-state Density Preserving Method for Second-order Stochastic Differential Equations

*Hugo A. de la Cruz*

**12:50 – MS7**

12:50 Fast Second-order Numerical Method for Variable-order Caputo Fractional Differential Equations

*Junseo Lee, Bongsoo Jang*

13:10 An Efficient Computational Technique for 2D Time-Fractional Diffusion Problem

*Natesan Srinivasan, Sandip Maji*

**13:30 – LUNCH TIME**

**16:00 – MS7**

16:00 - Optimal Long-time Decay Rate of Solutions of Complete Monotonicity-preserving Schemes for Nonlinear Time-fractional Evolutionary Equations

*Martin Stynes, Dongling Wang*

16:20 - A stabilizer-free weak Galerkin finite element method for the distributed order time-fractional diffusion equation

*Suayip Toprakseven, Natesan Srinivasan*

16:40 - A Method-of-lines Approach for Space-fractional Nonlinear PDEs

*Paul Andries Zegeling*

**17:00 - COFFEE BREAK****17:30 – General Session (3)**

Chair: *Hennie Husniah*

17:30 - Surface Effects on Propagation of Shear Horizontal Waves on Nonlocal PE-PM Bilayer Structure with an Imperfect interface

*Sudarshan Dhua, Subrata Mondal*

17:50 - Numerical Simulation of 3D Vorticity Dynamics with the Diffused Vortex Hydrodynamics Method

*Danilo Durante, Salvatore Marrone, Dirk Brommel, Robert Speck, Andrea Colagrossi*

18:10 - Radial Basis Function Interpolation for Child's Hand X-ray Image Processing

*Jakub Krzysztof Grabski*

**IMACS2023**    Wednesday 09/13/2023    **PLENARY ROOM #38**

**9:00 - KEYNOTE LECTURE**

Chair: *Thiab Taha*

Arbitrarily High Order Finite Element Methods for Arbitrarily Shaped Domains with Automatic Mesh Generation

*Zhiming Chen*

**10:00 – SS3**

DELAY DIFFERENTIAL EQUATIONS AND APPLICATIONS

Organizer: *Eva Kaslik, Mihaela Neamtu*

10:00 - Dynamics Analysis of a Socioecological System

*Andreea Maria Ardeuan, Eva Kaslik, Mihaela Neamtu*

10:20 - A Time-Delayed System of Identical Theta Neurons

*Lavinia Birdac, Eva Kaslik*

10:40 - A Mixed Oligopoly Model with Time Delays

*Loredana Camelia Cuda, Eva Kaslik, Mihaela Neamtu*

**11:00 – COFFEE BREAK**

**11:30 – SS3**

11:30 - Coupled Wilson-Cowan Systems with Distributed Delays

*Eva Kaslik, Emanuel-Attila Kokovics, Anca Radulescu*

11:50 - Dynamics of a pituitary-adrenal model with distributed time delays

*Eva Kaslik, Maria Roxana Matei, Mihaela Neamtu*

12:10 - Stability and Hopf Bifurcation Analysis of an Unemployment Model with Distributed Time Delays

*Eva Kaslik, Mihaela Neamtu, Loredana Vesa*

**12:30 – SS6**

MATHEMATICS OF EMERGING AND RE-EMERGING HUMAN INFECTIOUS DISEASES OF MAJOR PUBLIC HEALTH IMPORTANCE

Organizer: *Jean Lubuma*

12:30 - Mathematical Analysis of the Impact of the Face Mask on COVID-19

*Mahmoud H. DarAssi*

12:50 - Some Qualitatively Reliable Models for Epidemic Spread

*Istvan Faragó*

13:10 - Age-structured Mathematical Models based on Nonlinear ODEs to Study the Optimality of Vaccination Strategies for COVID-19 Pandemic

*Gilberto Gonzalez-Parra, Giulia Luebben, Bhumika Bhakta, Bishop Cervantes*

**13:30 - LUNCH TIME**

**IMACS2023**    Wednesday 09/13/2023    **PLENARY ROOM #38**

**15:00 – SS6**

15:00 - A Metapopulation Model for the 2014-2016 West Africa Ebola Virus Disease Outbreak, Part I: Exit Screening and Quarantine Measures

*Jean M-S Lubuma, Arsene Jaures Ouemba Tasse, Berge Tsanou, Jean Louis Woukeng*

15:20 - A Metapopulation Model for the 2014-2016 West Africa Ebola Virus Disease Outbreak, Part II: Optimal Control Strategies

*Vuyiswa B Kubalasa, Jean M-S Lubuma, Arsene Jaures Ouemba Tasse, Berge Tsanou, Jean Louis Woukeng*

15:40 - SEIR Epidemic Mathematical Model in the Presence of Hoax

*Asep Kuswandi Supriatna, Hennie Husniah, Yedi Purwanto, Ahmad S. Indrapriyatna*

16:00 - Positivity Preserving Numerical Methods Applied to Epidemic Models

*Bálint Máté Takács, István Faragó, Gabriella Svantnerné Sebestyén*

**16:20 – SS5**

MATHEMATICAL AND COMPUTATIONAL METHODS FOR MIGRATION, AGGREGATION AND INTERACTION OF CELL POPULATIONS

Organizers: *Gabriella Bretti, Marta Menci*

16:20 - Dynamics of Circulating Tumor Cells in Blood Vessels: Mathematical Modeling and Data Assimilation

*Giorgia Ciavolella, Annabelle Collin, Christèle Etchegaray, Jacky Goetz, Julien Granet, Nael Osmani*

16:40 - Kinetic models for cell migration in the microenvironment: from the microscopic to the macroscopic scale

*Nadia Loy, Martina Conte*

**17:00 - COFFEE BREAK**

**17:30 – SS5**

17:30 - GPU Parallel Numerical Simulations of the Gatenby-Gawlinski Model with Anisotropic, Heterogeneous Acid Diffusion

*Mascia Corrado, Donato Pera, Chiara Simeoni*

17:50 - Modelling Cell Migration: a Hybrid Approach for Cancer-on-chip Experiment

*Marta Menci*

18:10 - Large-scale Dynamics of Self-propelled Particles Moving through Obstacles: How Environment Affects Particle Swarms

*Diane Peurichard*

**18:30 – IMACS GENERAL ASSEMBLY**



**10:00 – MS5**

MODELING, DESIGN OPTIMIZATION AND CONTROL IN SMART GRIDS

Organizers: *Dhaker Abbes, Benoit Robyns*

10:00 - A Cooperative Distributed Droop Gains Adjustment in DC Microgrid  
*Youssef Alidrissi, Houda El Ouadoud, Serge Pierfederici, Matthieu Urbain, Radouane Ouladsine, Mohamed Bakhouya*

10:20 - Short-term Electricity Price Forecasting through Demand and Renewable Generation Prediction  
*Enrique Belenguer, Jorge Segarra-Tamarit, Emilio Pérez, Ricardo Vidal*

10:40 - Coalitional Game-Based Gain Generation and Distribution for Collective Self-Consumption in an Energy Community  
*Adrien Bossu, Benoit Durillon, Arnaud Davigny, Herve Barry, Sabine Kazmierczak, Christophe Saudemont, Fateh Belaid, Benoît Robyns*

**11:00 – COFFEE BREAK****11:30 – MS5**

11:30 - Exploration and optimisation of voltages patterns provided by a Multi-Active-Bridge with n ports  
*Ismael Chirino Aguinaga, Nicolas Patin, Vincent Lanfranchi, Patrice Gomez, Jeanne-Marie Dalbavie*

11:50 - Modeling, Optimization and Management Strategies for a Microgrid with Integrated Thermal Energy Storage  
*Paolo D'Angelo, Fulvio Bassetti, Antonio Scafuri, Walter Zamboni*

12:10 - Artificial Intelligence and Blockchain for Decentralized Energy Management in an Energy Community of Smart Buildings  
*Amira Dhorbani, Dhaker Abbes, Kahina Hassam, Benoit Robyns*

12:30 - Optimizing Electric Bus Charging: Dynamic Tariffs in a Bi-level Framework Considering Weather Conditions and Energy Storage  
*Jônatas Augusto Manzolli, João Pedro Trovão, Carlos Henggeler Antunes*

12:50 - Aerodynamic models for wind turbines that contribute to grid frequency control  
*Pau Martinez-Ortuno, Nestor Aparicio*

13:10 - Multi-Agent Reinforcement Learning for Strategic Bidding in the Electricity Market  
*Francesco Morri, H el ene Le Cadre, Luce Brotcorne, Pierre Gruet*

**13:30 – LUNCH TIME**

**15:00 – MS5**

15:00 - Frequency Response of a 15 MW Offshore Wind Turbine for Low Frequency Stability Analysis

*Gala Navarro-Martinez, Jaime Martinez-Turegano, Ramon Blasco-Gimenez*

15:20 - Pitch control design for black-start operation of a 15MW offshore wind turbine

*Gala Navarro-Martinez, Jaime Martinez-Turegano, Ramon Blasco-Gimenez*

15:40 - Analysis of Non-uniform Grid-forming Control Techniques for the HVDC Connection of Renewable Energy

*Patricia Penades-Huesca, Adrian Beneit-Barajas, Jaime Martinez-Turegano, Ramon Blasco-Gimenez*

16:00 - Multi-Objective Model for Residential Energy Management in Context of Renewable Communities

*Sergio Ramos, Luis Roque, Joao Soares, Antonio Gomes, José Calvo Rolle, Zita Vale*

16:20 - Machine Learning Algorithms Applied to Smart Buildings with High Penetration of Electric Vehicles

*Joao Soares, Thiago Cesar Rosa, Sergio Ramos, Bruno Canizes, Zita Vale*

16:40 - Standby Thermal Management Methods and Hybrid Configuration for a Large Scale Vanadium Flow Battery

*Andrea Trovò, Giacomo Marini, Jianyu Zhang, Walter Zamboni, Massimo Guarnieri*

**17:00 COFFEE BREAK****17:30 – MS5**

17:30 - Sizing of Storage under Uncertainty

*Xin Wen, Dhaker Abbas, Bruno Francois*

**17:50 – TC ELECTRIMACS Meeting**

**10:00 – MS1**

ADAPTED TIME-INTEGRATORS FOR DIFFERENTIAL AND INTEGRAL PROBLEMS WITH APPLICATIONS

*Organizers: Angelamaria Cardone, Dajana Conte, Severiano Gonzalez Pinto, Beatrice Paternoster*

10:00 - Numerical Issues Arising in the Equation for the Unsaturated Flow in Porous Media

*Marco Berardi*

10:20 - Accurate Simulation of the NLS Equations via Multiple-Relaxation ImEx Methods

*Abhijit Biswas, David I. Ketcheson*

10:40 - The Class of Implicit-explicit General Linear Methods for Ordinary Differential Equations

*Michał Braś*

**11:00 – COFFEE BREAK****11:30 – MS1**

11:30 - An Efficient Gauss-Newton Method for Non-linear Inverse Problems via Generalized Krylov Subspaces

*Alessandro Buccini, Patricia Diaz de Alba, Federica Pes, Lothar Reichel*

11:50 - Exponential Integrators for Problems with d-Dimensional Kronecker Structure

*Marco Caliari, Fabio Cassini*

12:10 - A class of Nystrom type methods for the numerical integration of second order differential equations

*Manuel Calvo, Juan Ignacio Montijano, Luis Randez*

12:30 - Modified Singly-RKTASE methods for the solution of stiff problems

*Manuel Calvo, Juan Ignacio Montijano, Luis Randez*

12:50 - A Magnus integrator for stochastic oscillators

*Raffaele D'Ambrosio, Hugo de la Cruz Cancino, Carmela Scalone*

13:10 - Numerical Conservation Issues for Stochastic PDEs

*Raffaele D'Ambrosio, Stefano Di Giovacchino*

**13:30 – LUNCH TIME**

**15:00 – MS1**

15:00 - Numerical and parallel issues for cellular behavior prediction

*Pasquale De Luca, Ardelio Galletti, Livia Marcellino*

15:20 - Boundary corrections for splitting methods in the time integration of multidimensional parabolic problems

*Severiano Gonzalez Pinto, Domingo Hernandez-Abreu, Soledad Perez-Rodriguez*

15:40 - Efficient Numerical Methods for High-dimensional Stochastic Differential Equations

*Yoshio Komori, Kevin Burrage*

16:00 - Space-time Parallel Solvers for the Solution of Parabolic Problems

*Laura Portero, Iñigo Jimenez, Andres Arraras, Francisco Gaspar*

16:20 - On the stability of IMEX-theta methods for parabolic PDEs with delay

*Alejandro Rodríguez-Fernández, Jesus Martin-Vaquero*

16:40 - A Numerical Method for Time-fractional Sub-diffusion Problems

*Hanna Britt Soots*

**17:00 COFFEE BREAK****17:30 – MS1**

17:30 - Application of Exponential Integrators for a Phase-Field Dendritic Crystal Growth Model

*Rouhollah Tavakoli, Damien Tournet*

17:50 - A New Method to Solve the 2D Schrodinger Equation

*Marnix Van Daele, Toon Baeyens*

18:10 - Fighting Agroecosystems Pests with Operations Research Tools

*Ezio Venturino*

**10:00 – MS8**

RECENT ADVANCES ON NUMERICAL METHODS FOR FUNCTIONAL EQUATIONS AND APPLICATIONS

Organizers: *Concetta Laurita, Donatella Occorsio, Maria Grazia Russo*

10:00 - Generalized-Hypergeometric Solutions in the Context of Heun Equations  
*Clemente Cesarano*

10:20 - Adapted numerical methods for reaction-diffusion problems  
*Dajana Conte, Gianluca Frasca Caccia, Giovanni Pagano, Beatrice Paternoster, Carmine Valentino*

10:40 - Numerical Model for Data Railway Fusion: diagnostic applications  
*Salvatore Cuomo, Mariapia De Rosa, Aurelio Mannara, Giuseppina Mastellone, Francesco Piccialli*

**11:00 – COFFEE BREAK****11:30 – MS8**

11:30 - Enrichment Strategies of the Bernardi Raugel Finite Element  
*Francesco Dell'Accio, Filomena Di Tommaso, Allal Guessab, Federico Nudo*

11:50 - A Nyström method for Hammerstein integral equations on a closed interval  
*Luisa Fermo, Anna Lucia Laguardia, Concetta Laurita, Maria Grazia Russo*

12:10 - On Computing Modified Moments for Half--range Hermite and Pollaczek--Hermite Weights in Floating Point Arithmetic  
*Teresa Laudadio, Nicola Mastronardi, Donatella Occorsio, Paul Van Dooren*

12:30 - On the Stability of Recurrence Relations Arising in Orthogonal Polynomials Frameworks  
*Teresa Laudadio, Nicola Mastronardi, Paul Van Dooren*

12:50 - A Method for the Approximation of Hadamard Transforms on  $[-1,1]$   
*Domenico Mezzanotte, Donatella Occorsio*

13:10 - Filtered Integration Rules for the Hilbert Transform on  $(0,+\infty)$   
*Donatella Occorsio, Woula Themistoclakis*

**13:30 – LUNCH TIME**

**15:00 – MS8**

15:00 - On Solving Some CSIE by de la Vallée Poussin Filtered Approximation  
*Donatella Occorsio, Maria Grazia Russo, Woula Themistoclakis*

**15:20 – SS7**

MODELING HUMAN PERCEPTION OF VISUAL INFORMATION

Organizer: *Giuliana Ramella*

15:20 - An Image Segmentation Approach for Space Syntax and Urban Mobility  
*Alfonso Annunziata, Federico Romaniello*

15:40 - Hierarchical Segmentation of Cell Compartments in Electron Microscope Images  
*Artur Bal, Marek Michalski, Łukasz Mielańczyk*

16:00 - A Perception-guided CNN for Grape Bunch Detection  
*Vittoria Bruni, Giulia Dominijanni, Domenico Vitulano, Giuliana Ramella*

16:20 - Contrast-based Image Enhancement for Source Camera Identification  
*Vittoria Bruni, Giuseppina Monteverde, Domenico Vitulano, Silvia Marconi*

16:40 - Application of Fractional Derivatives in Image Quality Assessment Indices  
*Mariusz Frackiewicz, Henryk Palus*

**17:00 - COFFEE BREAK****17:30 – SS7**

17:30 - Regular Shapes on Surfaces: Angles, Lengths, and How They Are Perceived  
*Claudio Mancinelli, Enrico Puppo*

17:50 - Advances in a Quantum Information-based Color Perception Theory  
*Edoardo Provenzi*

**18:10 – General Session (4)**

Chair: *Francisco Dominguez-Mota*

18:10 - On some Oscillatory Properties of Finite Difference Methods for One-Dimensional Nonlinear Parabolic Problems  
*Róbert Horváth*

**9:00 - KEYNOTE LECTURE**

Chair: Daniela Mansutti

Pattern in Turbulent Convection: the Evergreen Rayleigh-Bénard Problem  
*Antonello Provenzale, Jost von Hardenberg*

**10:00 – SS9**

NONLINEAR DYNAMICS FOR ECONOMICS, FINANCE AND SOCIAL SCIENCES

Organizer: *Fabio Tramontana*

10:00 - Border Collision Bifurcations in a Piecewise Linear Duopoly Model  
*Laura Gardini, Davide Radi*

10:20 - Dynamics of a Two-class Growth Model with Optimal Saving and Switch in Behavior

*Iryna Sushko, Pasquale Commendatore, Ingrid Kubin*

10:40 - Waveform Dictionaries and Gabor/wavelet Expansions in Finance

*Pierluigi Vellucci*

**11:00 – COFFEE BREAK****11:30 – MS10**

RECENT TRENDS IN NUMERICAL METHODS FOR EVOLUTIONARY PROBLEMS

Organizers: *Sebastianno Boscarino, Giuseppe Izzo, Eleonora Messina, Jie Shen*

11:30 - Multiscale Constitutive Framework of Blood Flow: Modeling and Numerics

*Giulia Bertaglia, Lorenzo Pareschi*

11:50 - Non Standard Methods for Volterra Integral Equations: a Case Study in Mathematical Epidemiology

*Bruno Buonomo, Eleonora Messina, Claudia Panico, Antonia Vecchio*

12:10 - Structure Preserving Schemes for the Allen-Cahn Type Equations

*Yongyong Cai*

12:30 - Conservative and Efficient Numerical Simulation for Time-Fractional Diffusion Problems

*Angelamaria Cardone, Gianluca Frasca-Caccia, Beatrice Paternoster*

12:50 - Numerical Preservation of Monotonicity and Positivity of Time-stepping Methods

*Inmaculada Higuera, Teo Roldan*

13:10 - New Highly Stiff-stable Schemes for Linear and Nonlinear Parabolic Equations

*Fukeng Huang, Jie Shen*

**13:30 - LUNCH TIME**

**15:00 – MS10**

15:00 - Unconditionally Positive and Conservative Modified Patankar Linear Multistep Methods

*Giuseppe Izzo, Eleonora Messina, Mario Pezzella, Antonia Vecchio*

15:20 - Approximation of high-order PDEs by hyperbolic systems

*David I. Ketcheson*

15:40 - Numerical Analysis and Simulation for Two-phase Incompressible Flows

*Xiaoli Li*

16:00 - An Energetic Spectral Element in Time Method for Nonlinear Gradient Systems

*Shiqin Liu, Haijun Yu*

16:20 - A General Framework of Implicit High-order Schemes for Hyperbolic Systems

*Gabriella Puppo, Matteo Semplice, Giuseppe Visconti*

16:40 - An Asymptotic Preserving, Parallel Class of Time Discretizations for Singularly Perturbed Equations

*Jochen Schuetz, Arjun Thenery Manikantan*

17:00 - Explicit Runge-Kutta Schemes with Weak Stage Order and an Optimal Number of Stages

*David Shirokoff, Abhijit Biswas, David Ketcheson, Steven Roberts, Benjamin Seibold*



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**ROOM #8**

**10:00 – General Session (5)**

Chair: *David Pardo*

10:00 - Numerical solutions of three-dimensional elliptic partial differential equations by the method of fundamental solutions and the particle swarm optimization

*Chia-Ming Fan, Fu-Li Chang, Chiung-Lin Chu*

10:20 - Optimal Upgrade Policy Model for Used Product Leased with Lemon Law

*Hennie Husniah, Andi Cakravastia A.R., Asep K. Spriatna, Bermawi P. Iskandar*

10:40 - Equation-Oriented Process Simulation: The Simultaneous Flash

*Mark Lazman*

**11:00 – COFFEE BREAK**

**11:30 – MS2**

LINEAR AND NONLINEAR MODELS IN APPLIED MATHEMATICS

Organizers: *Sandra Carillo, Galina Filipuk, Federico Zullo*

11:30 - Media with Inclusions with Imperfect Transmission and Interface Potential

*Micol Amar, Daniele Andreucci, Claudia Timofte*

11:50 - Probabilistic analysis and simulation of a class of compartmental models via random linear differential equation systems

*Vicente José Bevia, Juan Carlos Cortés, Cristina Pérez, Rafael Jacinto Villanueva*

12:10 - Superconductivity vs. Nematicity: a Ginzburg-Landau approach

*Juan Pablo Borgna, Mariano Fernando De Leo, Diego Fernando García Ovalle*

12:30 - Nonlinear Evolution Equations of Fifth Order: Some New and Old Results

*Sandra Carillo*

12:50 - A Molecular Dynamics Study of the Evolving Melt Front under Gravity

*Giovanni Ciccotti, Antonio Di Carlo, Mauro Ferrario, Daniela Mansutti*

13:10 - On the Thermodynamics of Composition Graded Thermoelastic Solids

*Vito Antonio Cimmelli*

**13:30 – LUNCH TIME**

**15:00 – MS2**

15:00 - Thermal Pulse Propagation beyond the Maxwell–Cattaneo Theory: a Nonlinear Generalization

*Maria Di Domenico, Antonio Sellitto, Vittorio Zampoli*

15:20 - Effects of temperature-dependent parameters on the reflection of thermoelastic waves under Moore-Gibson-Thomson heat conduction

*Manushi Gupta*

15:40 - Pinned Flexible Polymer under Oscillatory Linear Flow

*Antonio Lamura*

16:00 - Fractal Mixtures for heat draining

*Maria Rosaria Lancia*

16:20 - About the Zeros of the Lommel Functions

*Federico Zullo*

**17:00 – TC MMSEP Meeting**

**10:00 – MS6**

MULTIVARIATE APPROXIMATION: NUMERICAL METHODS AND APPLICATIONS

Organizers: *Costanza Conti, Stefano De Marchi, Elisa Francomano*

10:00 - Bivariate spline quasi-interpolants on criss-cross triangulations for the approximation of piecewise smooth functions

*Francesc Aràndiga, Paola Lamberti, Sara Remogna*

10:20 - Nonlinear quartic quasi-interpolating splines to approximate piecewise smooth functions

*Francesc Aràndiga, Paola Lamberti, Sara Remogna*

10:40 - MultiComponent Signals Interference Detection Exploiting HP-splines  
Frequency Parameter

*Vittoria Bruni, Rosanna Campagna, Domenico Vitulano***11:00 – COFFEE BREAK****11:30 – MS6**

11:30 - Time-frequency interpolation of wavelet scattering coefficients for signal classification

*Vittoria Bruni, Francesca Pelosi, Domenico Vitulano*

11:50 - Predictive modelling of soil microbiota growth using PINN

*Cuomo Salvatore, De Rosa Mariapia, Bottino Alessandro, Ruggeri Annachiara, Mango Dea M.L., Pace Roberta, Schiano Di Cola Vincenzo*

12:10 - On the numerical solution of some elliptic PDEs with Neumann boundary conditions through multinode Shepard method

*Francesco Dell'Accio, Filomena Di Tommaso, Elisa Francomano*

12:30 - Simple Strategies for Approximating Scattered Data and Functions

*Stefano De Marchi*

12:50 - Multilevel and Progressive Iterative Methods for Approximation and Numerical Integration

*Elena Fornaca, Paola Lamberti*

13:10 - Deep Mapping Techniques for Solving Time-Fractional PDEs Containing Crack and/or Corner Singularities

*Hyunju Kim, Jeonseo Lee, Taehyung Kim, Bongsoo Jang***13:30 – LUNCH TIME**

**15:00 – MS6**

15:00 - A Collocation Method for the Space-time Fractional Diffusion Problem  
*Chiara Sorgentone, Francesca Pitolli, Enza Pellegrino*

**15:20 – MS11**

RECENT TRENDS ON NUMERICS OF SINGULARLY PERTURBED DIFFERENTIAL EQUATIONS

Organizer: *Natesan Srinivasan*

15:20 - A direct discontinuous Galerkin finite element method for two parameter singular perturbation problems.

*Gautam Singh*

15:40 - A Novel Fully-Implicit FMM for 2D Singularly Perturbed Semilinear Parabolic PDEs with Non-homogeneous Boundary Data

*Narendra Singh Yadav, Kaushik Mukherjee*

16:00 - Richardson Extrapolation Technique for Singularly Perturbed Degenerate Parabolic PDEs with Two Parameters

*Natesan Srinivasan, Mrityunjoy Barman, Anirban Majumdar*

16:20 - The Local Discontinuous Galerkin Method for Two Singularly Perturbed Convection-Diffusion Problems with Exponential and Characteristic Layers

*Martin Stynes, Yao Cheng*

16:40 - A Weak Galerkin Method for a Third-order Singularly Perturbed Reaction-diffusion Problem

*Suayip Toprakseven, Natesan Srinivasan*

**10:00 – MS12**

SINGLE-SCALE AND MULTI-SCALE MODELLING: APPLICATIONS TO ECOLOGY, CELL BIOLOGY AND MEDICINE

Organizers: *Raluca Eftimie, Zeina Masry, Antoine Perasso, Ezio Venturino*

10:00 - Enhanced Forecasting of Biomass-toxicity-water Models Using Numerical Simulations

*Mudassar Abbas, Francesco Giannino, Francesco Calabro*

10:20 - A New Numerical Solution for an Age-Structured Population Model with Infinite Life Span

*Luis María Abia, Oscar Angulo, Juan Carlos López-Marcos, Miguel Ángel López-Marcos*

10:40 - Phenotype Divergence and Cooperation in Isogenic Multicellular and in Cancer

*Frank Ernesto Alvarez, Jean Clairambault*

**11:00 – COFFEE BREAK****11:30 – MS12**

11:30 - Stochastic Modeling of Biological Oscillations: the Circadian Rhythm Model

*Alberto Maria Bersani, Alessandro Borri, Gabriella Mavelli, Pasquale Palumbo*

11:50 - Evolution of Populations Structured by Dietary Diversity and Starvation: Cross-diffusion Systems

*Elisabetta Brocchieri*

12:10 - Modeling metastatic tumor evolution, numerical resolution and growth prediction

*Iulia Martina Bulai*

12:30 - Fractional Diffusive Fisher equation

*Clemente Cesarano*

**12:50 – SS13**

TRIANGULATIONS, MESHING AND APPLICATION

Organizers: *Miguel Padron, Jose Pablo Suarez Rivero*

12:50 - Near Equilateral Tetrahedra and the Convergence into Less Than 37 Similarity Classes

*Miguel Angel Padron, Agustin Rafael Trujillo, Jose Pablo Suarez*

13:10 - Compact and Efficient Data Structure for the Study of LEB of Tetrahedra

*Jose Pablo Suarez Rivero, Miguel Angel Padrón, Agustín Trujillo, María Pilar Abad*

**13:30 – LUNCH TIME**

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**ROOM #5**

**15:00 – General Session (6)**

***CANCELLED***

**9:00 - KEYNOTE LECTURE**

Chair: *Sandra Carillo*

Rise and fall of popularity on social media

*Andrea Tosin*

**10:00 – SS10**

NONLINEAR WAVES

Organizer: *Thiab Taha*

10:00 - A Global Characterization of Steady Periodic Waves over a Flat Seabed

*Matteo Antuono*

10:20 - Stability of Fronts in the Diffusive Rosenzweig-MacArthur Model

*Anna Ghazaryan, Stephane Lafortune, Yuri Latushkin, Vahagn Manukian*

10:40 - Stripe Pattern Formation in PNP Steric Model

*Tzyy-Leng Horng*

**11:00 – COFFEE BREAK****11:30 – SS10**

11:30 - Lagrangian Dynamics of Nonlinear Waves in Shallow-water Systems, Including Rotation, Baroclinicity, and Mean Flows

*Karima Khusnutdinova, Vladimir Zeitlin*

11:50 - Integrable nonlinear wave equations and Painleve hierarchies

*Andrew Pickering*

12:10 - Numerical Methods for Solving Nonlinear Evolution Equations

*Thiab R Taha*

12:30 - Construction of Solitary Wave for Fractional KdV Equation with Inhomogeneous Symbol

*Swati Yadav, Jun Xue*

**12:50 – General Session (7)**

Chair: *Róbert Horváth*

12:50 - Localized Nonsingular Method of Fundamental Solutions for Two-dimensional Laplace Problems

*Qingguo Liu, Zhuoija Fu, Shengnan Liu, Bozidar Sarles*

13:10 - Application of a Haar wavelet based numerical method to a moving obstacle avoidance problem for unmanned aerial vehicles

*Saurabh R. Madankar, Amit Setia, Muniyasamy M., Ravi P. Agarwal*

**13:30 – IMACS2023 CLOSING**

**10:00 – SS2**

## COMPUTER SIMULATIONS IN DIGITAL TWINS TECHNOLOGY

Organizer: *Bharat K. Soni*

10:00 - Digital Twin Technology in Maritime: MAAP Initiatives  
*Angelica Morales Baylon, Vadm Eduardo Ma R Santos*

10:20 - Non-Destructive Testing of 3D-Printed Parts Using Elastic Registration of Meshes in the X-ray Projection Domain  
*Julien Dompierre, Francois Guibault, Catherine Desrosiers, Nicolas Piche, Vladimir Brailovski, Farida Cheriet*

10:40 - AI-assisted Dental Restorations  
*Francois Guibault, Golriz Hosseinimanesh, Imane Chafi, Ammar Alsheghri, Ying Zhang, Julia Keren, Farnoosh Ghadiri, Farida Cheriet*

**11:00 – COFFEE BREAK****11:30 – SS2**

11:30 - Digital Twin Technology in Civil Engineering: Corrosion-Damage Detection on Concrete Structures

*José A. Guzmán-Torres, Francisco J. Domínguez-Mota, Gerardo Tinoco-Guerrero, José G. Tinoco-Ruíz, Wilfrido Martínez-Molina*

11:50 - Development of Wind Tunnel Digital Twin Using Data Assimilation  
*Kyosuke Nomoto, Shigeru Obayashi*

12:10 - Digital Twins Technology: Current Status and Future Directions  
*Bharat K. Soni*

**12:30 – General Session (8)**

Chair: *Antonio Vargas*

12:30 - Surface Effect on Lamb Wave Propagation in a Nonlocal Piezo-Electric and Piezo-Magnetic Bi-material Plate  
*Arpita Maji, Sudarshan Dhua*

12:50 - Solution of Fuzzy-fractional Allen-Cahn Equations Using a Robust Numerical Approach  
*Ramakanta Meher, Parthkumar P. Sattanpara, Ajay Kumar*

13:10 - Development of Almost Unbiased Modified Ratio Estimators for Population Mean Using Unknown Population Parameter(s)  
*Chika Obianuju Mmaduakor*



**10:00 – MS12**

SINGLE-SCALE AND MULTI-SCALE MODELLING: APPLICATIONS TO ECOLOGY, CELL BIOLOGY AND MEDICINE

Organizers: *Raluca Eftimie, Zeina Masry, Antoine Perasso, Ezio Venturino*

10:00 - Blood Sample Based Early Cancer Detection Using Conformal Prediction  
*Stephane Chretien, Paul Minchella, Loic Verlingue*

10:20 - Modelling inflammation in cancer and wound healing: single-scale and multi-scale approaches  
*Raluca Eftimie*

10:40 - Modelling and Investigating Memory Immune Response in Acute SARS-CoV-2 Reinfection.  
*Mathilde Massard, Catherine Chirouze, Raluca Eftimie, Quentin Lepiller, Antoine Perasso, Bruno Sausseureau*

**11:00 – COFFEE BREAK**

11:30 - Modelling Plant-nematodes Interactions to Understand Plant Tolerance  
*Joseph Penlap, Suzanne Touzeau, Frédéric Grogard, Valentina Baldazzi*

11:50 - Age-structured Malaria Transmission Model  
*Quentin Richard*

12:10 - Numerical Challenges for the Understanding of Snake-and-ladder Bifurcations in Nonlocal Hyperbolic systems for Ecological Aggregations  
*Thanh Trung Le, Raluca Eftimie*

**12:30 – General Session (9)**

Chair: *Chia-Ming Fan*

12:30 - Impact of Nonlocal Piezoelectricity on Propagation of Torsional Wave in Piezoelectric Fiber-Reinforced Composite  
*Subrata Mondal, Sudarshan Dhua*

12:50 - Multi-Agent Reinforcement Learning for Strategic Bidding in the Electricity Market  
*Francesco Morri, Hélène Le Cadre, Luce Brotcorne, Pierre Gruet*

13:10 - A Deep Neural Network Discontinuous Galerkin method for solving PDEs involving discontinuities  
*David Pardo, Angel J. Omella, Magdalena Strugaru, Ignacio Muga*

**10:00 – General Session (10)**

Chair: *Danilo Durante*

10:00 - Multi-objective Optimization of the Appendages of a Sailing Yacht Using the Normal Boundary Intersection Method

*Daniele Peri*

10:20 - Numerical Study of Non-linear Time Fractional Model of HIV/AIDS Transmission

*Vishalkumar J Prajapati, Ramakanta Meher*

10:40 - An Algebraic Technique for Determining the Maximal Cliques in a Graph

*Bhaba Kumar Sarma, Gete Umbrey, Murali Krishna Enduri*

**11:00 – COFFEE BREAK****11:30 – General Session (11)**

Chair: *Qingguo Liu*

11:30 - High order compact ADI scheme for two dimensional non-linear reaction subdiffusion equation

*Deeksha Singh, Rajesh K. Pandey*

11:50 - A Meshless Approach for Generalized Finite Difference Schemes

*Gerardo Tinoco-Guerrero, Francisco Javier Domínguez-Mota, José Alberto Guzmán-Torres, Ricardo Román-Gutiérrez, José Gerardo Tinoco-Ruiz*

12:10 - Mathematical Models on Brain Networks for the Progression of AD

*Veronica Tora*

12:30 - On a Solow model with spatial diffusion and technology-induced motility

*Antonio Vargas, Nicolás Ureña*

12:50 - Global Existence and Blow up of Solutions for Pseudo-parabolic Equations with Singular Potential

*Runzhang Xu*

13:10 - Numerical method for solving system of Cauchy singular integral equations of index zero

*Abhishek Yadav, Amit Setia, Ravi P. Agarwal*