

EMI 2023 International Conference

Palermo, Italy, August 27 - 30, 2023

BOOK OF ABSTRACTS



Prof. Massimo MIDIRI
Congress Chair
University of Palermo, Italy



Prof. Antonina Pirrotta
Congress Chair
University of Palermo, Italy



Prof. Pol D. SPANOS
Honorary Chair
Rice University, Houston, USA

EMI 2023 IC

PROGRAM

PALERMO August 27-30, 2023



Prof. Massimo MIDIRI
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University of Palermo, Italy



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EMI 2023 IC

PALERMO August 27-30, 2023

Program

Version 9 - Date 27/Aug/2023

Sunday - August 27, 2023

18:00 - 20:30 Registration and Welcome Cocktail

Orto Botanico

Monday - August 28, 2023

08:00 Registration

Aula Magna Business School Building 13

08:30 - 09:15 SESSION 1: Opening Session

Aula Magna Business School Building 13

SESSION 2

Aula Magna Business School Building 13

09:15 - 09:55

Title	Speaker
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[Plenary Lecture: Modeling and simulation of soil-structure-vehicle interaction of railway bridges subjected to high-speed trains](#)

Christoph Adam

10:00 - 11:00 SESSION 3

BUILDING 19

MS01 - 20(20)23 Stochastic Mechanics & Meccanica Stocastica 20(20)23 International Conference (23SM&MS23) in honor of Emeritus Professor Mario Di Paola

AULA 5

CHAIRS: Vittorio Gusella, Giuseppe Marano, Giuseppe Muscolino, Antonina Pirrotta

Title	Author(s)	Speaker
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10:00 Prelude

[The stochastic differential calculus for non-Gaussian delta-correlated input: the Di Paola-Falsone calculus after thirty years](#)

Giovanni Falsone

Giovanni Falsone

10:40 [Fragility Curves for Wooden Houses in Japan Based on Integrated Damage Data from the 2016 Kumamoto Earthquake](#)

Fumio Yamazaki, Kazuaki Torisawa

Fumio Yamazaki

MS05 - Computational modelling of Complex Flows with evolving interfaces

AULA Seminari B

CHAIRS: Michele La Rocca, Andrea Montessori, Sinan Özeren, Pietro Prestininzi

Title	Author(s)	Speaker
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10:00 [SPH modelling of high-density ratio multiphase flows with complex interfaces](#)

Nicolò Salis, Alessandro Reali, Sauro Manenti

Nicolò Salis

10:20 [Internal solitary wave trains: interaction and grouping into multi-humped configurations](#)

Giovanni La Forgia, Giampiero Sciortino, Valentina Lombardi, Pietro Prestininzi

Pietro Prestininzi

MS06 - Industrial Hydraulics

AULA 10

CHAIRS: V. Armenio, B. Brunone, A. Carravetta, M. De Marchis, O. Giustolisi, S. Malavasi

	Title	Author(s)	Speaker
10:00	A comparison between commercial devices for energy recovery in a real Water Distribution Network	Gabriella Balacco, Michele Stefanizzi, Gaetano D. Fiorese, Domenico Filannino, Marco Torresi, Orazio Giustolisi	Gabriella Balacco
10:20	Water Loss Estimation and Pipe Deformation in Water Distribution Network: Laboratory and Numerical experiments	Mauro De Marchis, Federica Bruno, Domenico Saccone, Fabrizio Traina, Enrico Napoli	Mauro De Marchis
10:40	Bayesian Identification of brackish water infiltration by Lagrangian sensors	Gabriele Freni, Mariacrocetta Sambito	Gabriele Freni

MS09 - Uncertainty Quantification, reliability and sensitivity analysis under limited data

AULA 8

CHAIRS: Alba Sofi, David Moens, Edoardo Patelli, Matthias Faes, Michael Hanss

	Title	Author(s)	Speaker
10:00	Invited Keynote Lecture: Probabilistic Approaches for Uncertainty Quantification with Sparse and Interval Data	Sankaran Mahadevan	Sankaran Mahadevan
10:40	Uncertainty propagation on the thunderstorm gust response factor via interval analysis	Luca Roncallo, Federica Tubino, Alba Sofi, Giuseppe Muscolino	Luca Roncallo

MS16 - Multiscale Mechanics and Nanostructures

AULA 7

CHAIRS: Ada Amendola, Raffaele Barretta, Fernando Fraternali, Antonina Pirrotta

	Title	Author(s)	Speaker
10:00	Prelude		
10:20	A hybrid continuous/discontinuous multiscale approach for analyzing damage localization phenomena in anisotropic composite microstructures	Daniele Gaetano, Fabrizio Greco, Lorenzo Leonetti, Arturo Pascuzzo	Lorenzo Leonetti
10:40	A multiphase approach to peridynamics	Federico Cluni, Vittorio Gusella, Dimitri Mugnai, Edoardo Proietti Lippi, Patrizia Pucci	Federico Cluni

	MS24 - Recent advances, applications and challenges of coupled free flow and porous media flow systems		<i>AULA 3</i>
	<i>CHAIRS: Martin Schneider, Holger Class, Rainer Helmig, Costanza Aricò, Donatella Termini</i>		
	Title	Author(s)	Speaker
10:00	Invited Keynote Lecture: Coupled Free and Porous-Medium Flow Processes – Models, Concepts and Analysis	Rainer Helmig, Martin Schneider, Edward Coltman, Anna Mareike Kostelecky, Maziar Veyskarami, Hanchuan Wu, Costanza Arico'	Rainer Helmig
10:40	Homogenization-Based Analytical Solution for Laminar Flow Problems in Channels Bounded by Rough/Permeable Walls	Essam Nabil Ahmed, Alessandro Bottaro	Essam Ahmed
	MS26 - Innovations in Biomechanics and Bio-Inspired Engineering		<i>AULA 9</i>
	<i>CHAIRS: Marco Amabili, Emanuela Bologna, Massimiliano Zingales</i>		
	Title	Author(s)	Speaker
10:00	Assessing the mechanical stimuli of bone remodeling through multiscale, micromechanics-inspired modeling	Stefan Scheiner, Christian Hellmich, Nenad Filipovic	Stefan Scheiner
10:20	Atlas-based Quantification of the Biomechanics of Patients with Transcatheter Aortic Valve Replacement	Chiara Catalano, Roberta Scuoppo, Stefano Cannata, Caterina Gandolfo, Salvatore Pasta	Salvatore Pasta
10:40	Uncertainty quantification of dynamic cerebral autoregulation in cardiovascular disease: A Bayesian compressive sampling approach	Leonidas Taliadouros, Maria I. Katsidoniotaki, Ioannis A. Kougioumtzoglou	Leonidas Taliadouros
	MS29 - Bio-fluid mechanics		<i>AULA 4</i>
	<i>CHAIRS: Valerio Caleffi, Giorgio Querzoli, Jan O. Pralits, Rodolfo Repetto, Annunziato Siviglia, Francesca Maria Susin</i>		
	Title	Author(s)	Speaker
10:00	Computational study of retinal blood flow coupled to a global circulation model	Alessia Casalucci, Rodolfo Repetto, Lucas Omar Muller, Annunziato Siviglia, Eleuterio Francisco Toro	Alessia Casalucci

10:20	From cine-MRI to Computational Models of Blood Flow in the Right Heart	Francesca Renzi, Marco Fedele, Christian Vergara, Vincenzo Giambruno, Alfio Quarteroni, Giovanni Puppini, Giovanni Battista Luciani	Francesca Renzi
10:40	Blood Flow Simulation in an Improved Blalock-Taussig Shunt in Patient Specific Geometries	Ramesh Agarwal	Ramesh Agarwal
MS31 - Multiscale and Multiphysics Modelling for 'Complex Materials' (MMCM18)			<i>AULA 6</i>
<i>CHAIRS: Marco Pingaro, Patrizia Trovalusci, Emanuele Reccia, Greta Ongaro</i>			
	Title	Author(s)	Speaker
10:00	Multiscale approach for modeling the elastic and fracture properties of nanomodified epoxy resins	Greta Ongaro, Razie Izadi, Marco Pingaro, Patrizia Trovalusci, Roberta Bertani	Greta Ongaro
10:20	Buckling Property of Woven Fabric Composite Laminate with a Small Number of Plies	Keishiro Yoshida, Tatsuya Kitao, Keita Oda	Keishiro Yoshida
10:40	Computational thermo-elastic steady-state homogenization of polycrystals by boundary elements	Ivano Benedetti, Alberto Milazzo	Ivano Benedetti
MS39 - Computational intelligence in structural engineering & structural optimization			<i>AULA 1</i>
<i>CHAIRS: Fabio Di Trapani, Josephine Voigt Carstensen, Cristoforo Demartino, Giuseppe Carlo Marano</i>			
	Title	Author(s)	Speaker
10:00	Advances of a GA-based optimization procedure for seismic upgrading of RC structures	Francesco Nigro, Enzo Martinelli	Francesco Nigro
10:20	Structural optimization for designing sustainable structures under seismic condition	Emanuele Crespino, Sigrid Adriaenssens, Aguinardo Fraddosio, Carlo Olivieri, Mario Daniele Piccioni	Emanuele Crespino
10:40	Free vibrations of shear deformable beams and frames in presence of multiple cracks	Francesco Cannizzaro, Ilaria Fiore, Salvatore Caddemi, Ivo Calìò	Francesco Cannizzaro

11:00 - 11:40 Coffee break

**MS01 - 20(20)23 Stochastic Mechanics & Meccanica Stocastica 20(20)23
International Conference (23SM&MS23)
in honor of Emeritus Professor Mario Di Paola**

AULA 5

CHAIRS: Vittorio Gusella, Giuseppe Marano, Giuseppe Muscolino, Antonina Pirrotta

	Title	Author(s)	Speaker
11:40	Efficient stochastic response determination of nonlinear systems based on a reduced-order formulation of the Wiener path integral technique in conjunction with high-performance computing strategies	Ketson R. M. dos Santos, Ioannis A. Kougioumtzoglou	Ketson R. M. dos Santos
12:00	Stochastic response determination of an array of coupled nonlinear micromechanical oscillators based on an efficient reduced-order formulation of the Wiener path integral technique	Maria I. Katsidoniotaki, Ioannis Petromichelakis, Ioannis A. Kougioumtzoglou	Maria I. Katsidoniotaki
12:20	Solving Partial Differential Equations with Quantum Approximate Bayesian Optimization Algorithm	Jungin Kim, Jinhwan Sul, Yan Wang	Yan Wang

MS04 - First new science, on the resistance of solid bodies to be broken. A mini-symposium in honor of Roberto Ballarini on the occasion of his 65th birthday

AULA 2

CHAIRS: Jia-Liang Le, Gianni Royer-Carfagni

	Title	Author(s)	Speaker
11:40	Invited Keynote Lecture: Structural Testing at micrometer and nanometer scales	Roberto Ballarini	Roberto Ballarini
12:20	Flextegrity and sheartegritty demonstration models for the multiscale analysis of structured materials and metamaterials	Gianni Royer Carfagni, Claudio Boni	Gianni Royer Carfagni

MS06 - Industrial Hydraulics

AULA 10

CHAIRS: V. Armenio, B. Brunone, A. Carravetta, M. De Marchis, O. Giustolisi, S. Malavasi

	Title	Author(s)	Speaker
11:40	Total drag estimation of turbulent flow over industrial rough surfaces	Federica Bruno, Mauro De Marchis, Stefano Leonardi	Federica Bruno
12:00	Data-driven models for water distribution networks: A promising Machine Learning approach for improving efficiency and sustainability	Gabriele Restuccia, Ilenia Tinnirello, Fulvio Lo Valvo, Giacomo Baiamonte, Domenico Garlisi, Costantino Giaconia	Gabriele Restuccia
12:20	Numerical study of noise reduction by air-sheet barriers in water	Naira Hamid	Naira Hamid

MS16 - Multiscale Mechanics and Nanostructures

AULA 7

CHAIRS: Ada Amendola, Raffaele Barretta, Fernando Fraternali, Antonina Pirrotta

	Title	Author(s)	Speaker
11:40	Computational Methods for Wave Dispersion Analysis in Stress-Driven Nonlocal Rayleigh Beam Lattices	Andrea Francesco Russillo, Giuseppe Failla, Gioacchino Alotta	Giuseppe Failla
12:00	Steady vibration problems in the coupled theory of thermoviscoelasticity for triple porosity materials	Maia M. Svanadze, Merab Svanadze	Merab Svanadze
12:20	A viscoelastic nonlocal model for microtubules used as vibrational biosensors	Francesco Paolo Pinnola, Francesco Marotti de Sciarra	Francesco Paolo Pinnola

MS24 - Recent advances, applications and challenges of coupled free flow and porous media flow systems

AULA 3

CHAIRS: Martin Schneider, Holger Class, Rainer Helmig, Costanza Aricò, Donatella Termini

	Title	Author(s)	Speaker
11:40	A framework for data-driven multi-scale parametrizations in coupled porous media and free-flow systems	Edward Coltman, Martin Schneider, Rainer Helmig	Edward Coltman
12:00	Fluid-Structure Interaction in Reverse Osmosis membrane modules	G. Battaglia, L. Ranieri, B. Blankert, G. Micale, C. Piciooreanu	Giuseppe Battaglia
12:20	A Finite Element approach to address the 3D coupled thermo-mechanical and neutron diffusion problem on cementitious materials	Jiangkun Zhang, Beatrice Pomaro, Gianluca Mazzucco, Beaudin Freinrich Dongmo, Valentina Salomoni, Carmelo Majorana	Beatrice Pomaro

MS26 - Innovations in Biomechanics and Bio-Inspired Engineering

AULA 9

CHAIRS: Marco Amabili, Emanuela Bologna, Massimiliano Zingales

	Title	Author(s)	Speaker
11:40	Large Scale Biomimicry Impact of Three-Dimensional Annulus Shape and Leaflet Lateral Profile on Engineered Mitral Valve Mechanics, a Numerical Analysis	Elisa Lanzalaco, Joan Dario Laubrie Soto, Federica Cosentino, Giuseppe Raffa, Michele Pilato, Vincenzo La Carrubba, Antonio Pantano, Antonio D'Amore	Elisa Lanzalaco

12:00	A MicroCT in situ protocol to reveal the structure-function relation in electrospun hierarchical scaffolds for tendon/ligament regeneration	Gregorio Marchiori, Alberto Sensini, Nicola Sancisi, Gianluca Tozzi, Massimiliano Zingales, Gaia Prezioso, Andrea Zucchelli, Gianluca Giavaresi	Gregorio Marchiori
MS29 - Bio-fluid mechanics			<i>AULA 4</i>
<i>CHAIRS: Valerio Caleffi, Giorgio Querzoli, Jan O. Pralits, Rodolfo Repetto, Annunziato Siviglia, Francesca Maria Susin</i>			
	Title	Author(s)	Speaker
11:40	Homogenization of osmotic flows across thin permeable membranes	Kevin Wittkowski, Edoardo Carlo Giordano, Pier Giuseppe Ledda, François Gallaire, Giuseppe Antonio Zampogna	Kevin Wittkowski
12:00	A fluid structure interaction model of the vibration frequencies of the eye bulb	Tomassetti Giuseppe, Tambroni Nicoletta, Rodolfo Repetto	Tomassetti Giuseppe
12:20	Effect of Heart Contraction on Coronary Arteries' Flow Rate	Seyyed Mahmoud Mousavi, Gianluca Zitti, Jolanda J. Wentzel, Marco Pozzi, Maurizio Brocchini	Seyyed Mahmoud Mousavi
MS31 - Multiscale and Multiphysics Modelling for 'Complex Materials' (MMCM18)			<i>AULA 6</i>
<i>CHAIRS: Marco Pingaro, Patrizia Trovalusci, Emanuele Reccia, Greta Ongaro</i>			
	Title	Author(s)	Speaker
11:40	Investigating elastic- and entropic-driven rupture mechanisms of biomembranes	Salvatore Buonocore, Rosario Capozza, Francesco De Angelis	Salvatore Buonocore
12:00	Bearing capacity of truss lattice structures	Mattia Schiantella, Federico Cluni, Vittorio Gusella	Mattia Schiantella
12:20	Coupling Virtual Element Method (VEM) and Interface Elements for modelling fracture propagation in Grain Boundaries materials	Cristina Gatta, Marco Pingaro, Daniela Addressi, Patrizia Trovalusci	Marco Pingaro

MS40 - Innovations in Structural Dynamics Models and Experiments*AULA Seminari A***CHAIRS: Giovanni Fabbrocino, Giacomo Navarra, Massimiliano Giofrè, Francesco Lo Iacono, Stefano Ercolessi**

	Title	Author(s)	Speaker
11:40	Dynamic characterization and shake-table experimental validation of an innovative base-isolation device for seismic protection of statues	Giacomo Navarra, Francesco Lo Iacono, Elena Alberti, Maria Oliva	Giacomo Navarra
12:00	Numerical modeling of the seismic response and damage of full-scale masonry arches and vaults	Roberta Scungio, Chiara Pepi, Massimiliano Giofrè	Roberta Scungio
12:20	Preliminary experimental tests and numerical modelling of an innovative base isolation system	Francesco Lo Iacono, Giuseppe Mugnos, Giacomo Navarra, Alessandro Bianchi, Roberto Giacchetti	Francesco Lo Iacono

MS39 - Computational intelligence in structural engineering & structural optimization*AULA 1***CHAIRS: Fabio Di Trapani, Josephine Voigt Carstensen, Cristoforo Demartino, Giuseppe Carlo Marano**

	Title	Author(s)	Speaker
11:40	Cost and embodied carbon-based optimization of seismic retrofit of RC frame structures using evolutionary algorithms	Fabio Di Trapani, Antonio Pio Sberna, Josephine V. Carstensen, Giuseppe Carlo Marano	Fabio Di Trapani
12:00	Iterative partial stiffening process for the reduction of shell buckling	Alex Seiter, Thorsten Pofahl, Martin Trautz	Alex Seiter
12:20	Research on Intelligent Design Method for Structural Topology of Complex Architectural Plans	Chong Zhang, Chen Wang, Muxuan Tao, Jiansheng Fan	Chong Zhang

MS05 - Computational modelling of Complex Flows with evolving interfaces*AULA Seminari B***CHAIRS: Michele La Rocca, Andrea Montessori, Sinan Özeren, Pietro Prestininzi**

	Title	Author(s)	Speaker
11:40	Allied Denoising Convolutional Neural Network for State-of-Health Estimation for Lithium-Ion Batteries	Sun Geu Chae, Suk Joo Bae	Sun Geu Chae
12:00	Emulsion dynamics in an idealized porous matrix	Stefano Miliani, Andrea Montessori, Michele La Rocca, Pietro Prestininzi	Pietro Prestininzi

12:40 - 14:00 Lunch

14:00 - 16:00 SESSION 5 (Junior Sessions)

BUILDING 19

Junior MS02 - Mathematical models and methods for Structural Systems

AULA 5

CHAIRS: Andrea Burlon, Rossella Laudani

	Title	Author(s)	Speaker
14:00	Wave propagation modeling in periodic magneto-electro-elastic materials via multi-field continualization	Rosaria Del Toro, Maria Laura De Bellis, Andrea Bacigalupo	Rosaria Del Toro
14:20	A Dimension Reduction Approach based on the Wiener Path Integral For Determining The Stochastic Response Of Nonlinear Systems With Fractional Derivative Elements	Ilias Mavromatis, Ioannis Kougioumtzoglou	Ilias Mavromatis
14:40	A low energy and slow timescale control device for the re-tuning of a suboptimal tuned mass damper	Anass Mayou, Vincent Denoël	Anass Mayou
15:00	Sensitivity of a granular homogeneous and isotropic second-gradient continuum model with respect to uncertainties	Gabriele La Valle, Bilen Emek Abali, Giovanni Falsone, Christian Soize	Gabriele La Valle
15:20	Mechanical behaviour of polymeric cords used in tyres	Lucas Pires da Costa, Marco Moscatelli, Paola Caracino, Claudia Comi, Giorgio Novati	Lucas Pires da Costa
15:40	Diffusion of the aging fluid in a bidimensional homogeneous body	Angelo Scrofani, Emilio Barchiesi, Bernardino Chiaia, Anil Misra, Luca Placidi	Angelo Scrofani

Junior MS03 - Probabilistic methods for uncertainty quantification and Bayesian solutions to structural identification problems

AULA 6

CHAIRS: Chiara Pepi, Silvia Monchetti, Cecilia Viscardi

	Title	Author(s)	Speaker
14:00	Approximate Bayesian Computation and surrogate modeling for structural identification of simple structural systems	Chiara Pepi, Silvia Monchetti, Cecilia Viscardi, Massimiliano Gioffrè, Gianni Bartoli, Roberta Scungio	Roberta Scungio
14:20	A probabilistic approach for regional post-earthquake damage assessment in bridges using Bayesian networks	Pooria Mesbahi, Enrique García-Macías, Marco Breccolotti, Filippo Ubertini	Pooria Mesbahi

14:40	Global sensitivity analysis of metabarriers for seismic surface wave attenuation using surrogate modeling	Farhad Zeighami, Leonardo Sandoval, Alberto Guadagnini, Vittorio Di Federico	Farhad Zeighami
15:00	Modeling creep-assisted failure of viscoelastic materials based on the phase field approach	Ajinkya Dusane, Pietro Lenarda, Marco Paggi	Ajinkya Dusane
15:20	Bayesian updating of a multi-storey timber building	Blaž Kurent, Noemi Friedman, Boštjan Brank	Blaž Kurent
15:40	Parametric Algorithm-Aided design of optimal long-span hollow-section steel beams	Alessandra Fiore, Iris Tarallo, Giuseppe Carlo Marano	Iris Tarallo
Junior MS04 - Toward novel theoretical methods and experimental techniques for structural health monitoring of civil structures			<i>AULA 7</i>
CHAIR: Domenico Camassa			
	Title	Author(s)	Speaker
14:00	Signal processing techniques for bridge damage identification using vehicle monitoring	Giulia Sansone, Jean-Luc Dion, Stefania Lo Feudo, Paolo Lonetti, Arturo Pascuzzo	Giulia Sansone
14:20	On-site application of radar interferometry to the estimation of axial force in tie rods for historical masonry constructions	Domenico Camassa, Anna Castellano, Antonio Curri, Aguinardo Fraddosio, Mario Daniele Piccioni	Antonio Curri
14:40	Measurements of vibrations induced by vehicles according to ISO 2631-1 and ISO 5349-1	Giovanni Artale, Valentina Cosentino, Dario Fiandaca, Francesco Oddo, Antonina Pirrotta	Francesco Oddo
15:00	Modal identification of concrete bridge decks with dapped-end girders	Matteo Mazzeo, Dario De Domenico, Davide Messina, Antonino Recupero, Roberta Santoro	Matteo Mazzeo
15:20	A Comparative Analysis of Nonlinear Hysteretic Models in Oscillating Systems	Raffaele Capuano, Davide Pellecchia, Tommaso Coppola, Nicolò Vaiana	Davide Pellecchia
15:40	Detection of Water Content Profile of Concrete Using Ground Penetrating Radar	Zihan Xia, Liyu Xie, Zheng Lu, XiaoLi Fu, Chao Shen	Zihan Xia

Junior MS05 - Sustainable Urban Mobility for Liveable Neighbourhood*AULA 8***CHAIR: Gabriele D'Orso**

	Title	Author(s)	Speaker
14:00	A microtransit pilot study in Palermo, Italy	Martina Citrano, Marco Migliore	Martina Citrano
14:20	Measuring Walkability and Cyclability in Urban Areas around Railway Stations: A GIS-Based Approach in Palermo, Italy	Muhammad Yasir, Marco Migliore	Muhammad Yasir
14:40	Walkability assessment for improving the attractiveness of the public transport system in the suburban areas.	Leonardo Minaudo, Marco Migliore	Leonardo Minaudo
15:00	The potential of Demand Responsive Transport (DRT) to enhance accessibility in suburban areas: the case of Palermo (Italy)	Pierfrancesco Leonardi, Vincenza Torrisi, Matteo Ignaccolo	Pierfrancesco Leonardi
15:20	Reduction of Hand-Arm Vibrations (HAV) when driving electric scooters.	Salvatore Russotto, Salvatore Orlando, Andrea Evola, Antonina Pirrotta, Alessandro Albano, Antonella Plaia, Antonio Galvano, Antonio Russo	Salvatore Orlando

16:00 - 16:20 Coffee break

16:20 - 19:20 SESSION 6 (Junior Sessions)

*BUILDING 19***Junior MS02 - Mathematical models and methods for Structural Systems***AULA 5***CHAIRS: Andrea Burlon, Rossella Laudani**

	Title	Author(s)	Speaker
16:20	Non linear invariant beam formulations: The Kirchhoff-Love rod case	Leopoldo Greco, Massimo Cuomo, Domenico Castello, Simone Scalisi	Domenico Castello
16:40	Closed-form solutions for mass moments of domains having inhomogeneous density distribution and arbitrary shape	Davide Pellecchia, Nicolò Vaiana, Agnese Spedicato, Anna Castellano	Davide Pellecchia
17:00	Uncertainty in the model of out-of-plane mechanisms for masonry structures	Matteo Mazzeo, Rossella Laudani, Roberta Santoro	Matteo Mazzeo
17:20	An inerter-based isolation system for the vibration control of a continuous girder bridge under longitudinal seismic action	Silvia Scutteri, Dario De Domenico, Giuseppe Ricciardi	Silvia Scutteri

17:40	Cloaking surface defects from Rayleigh waves using anisotropic symmetric yet feasible materials	Zinon Chatzopoulos, Antonio Palermo, Andre Diatta, Sebastien Guenneau, Alessandro Marzani	Zinon Chatzopoulos
18:00	Wave-based vibration analysis of jointed metamaterial rods	Bartłomiej Piwowarczyk, Michael Leamy, Paweł Paćko	Bartłomiej Piwowarczyk
18:20	Stability of a periodic grid with rigid finite-sized joints	Nicola Marasciuolo, Francesco Trentadue, Domenico De Tommasi	Nicola Marasciuolo
18:40	Experimentally validated stochastic generation of numerical samples of hydrated cement paste	Felix Mett, Matteo Broggi, Michael Beer	Felix Mett
Junior MS06 - Modeling and analysis of advanced materials and structures			<i>AULA 6</i>
CHAIRS: Gioacchino Alotta, Francesco Paolo Pinnola			
	Title	Author(s)	Speaker
16:20	A flextegrity structure inspired by Leonardo da Vinci's triangular segmental construction	Claudio Boni, Gianni Royer Carfagni	Claudio Boni
16:40	Some insights for a new constitutive model of snow	Gianmarco Vallero, Monica Barbero, Fabrizio Barpi, Mauro Borri-Brunetto, Valerio De Biagi	Gianmarco Vallero
17:00	Creep due to the humidity variations in a polymeric bidimensional homogeneous beam	Angelo Scrofani, Emilio Barchiesi, Anil Misra, Luca Placidi	Angelo Scrofani
17:20	Multifield nonlocal identification of periodic thermoelastic materials with two relaxation times	Rosaria Del Toro, Maria Laura De Bellis, Andrea Bacigalupo	Rosaria Del Toro
17:40	A poromechanical approach for subcutaneous drug delivery	Simona Lo Franco	Simona Lo Franco
18:00	New perspectives into the non-smooth contact dynamics of rigid masonry blocks	Mario Argenziano, Enrico Babilio, Yoshiki Ikeda, Massimiliano Fraldi	Mario Argenziano

Junior MS07 - New trends in structural health monitoring and retrofitting for sustainable maintenance of structures and infrastructures

AULA 8

CHAIRS: Marianna Crognale, Melissa De Iuliis, Cecilia Rinaldi

	Title	Author(s)	Speaker
16:20	Digital Twin for Cultural Heritage Monitoring	Cosimo Pellecchia, Marianna Crognale, Melissa De Iuliis, Cecilia Rinaldi, Gian Paolo Cimellaro, Vincenzo Gattulli	Cosimo Pellecchia
16:40	BIM/FEM interoperability for modeling and management of the Moulay Abdellah arch dam	Cecilia Mastroiacovo, Cecilia Rinaldi, Riccardo Zoggia, Amine Bendarma, Vincenzo Gattulli	Cecilia Mastroiacovo
17:00	Dynamic identification of slender structures by means of stochastic subspace identification method.	Massimo Cuomo, Leopoldo Greco, Simone Scalisi, Domenico Castello	Domenico Castello
17:20	Scan-to-BIM procedures for the management of built environment	Francesco Di Benedetto, Luana Pinnetti, Marianna Crognale, Melissa De Iuliis, Cecilia Rinaldi, Vincenzo Gattulli	Marianna Crognale
17:40	Seismic isolation of art objects via inverted pendulum devices: from theory to practise	Giuseppe Tommaso Di Venti, Francesco Cannizzaro, Salvatore Caddemi, Ivo Caliò	Giuseppe Tommaso Di Venti

Junior MS01 - Innovative applications and modeling of additive manufacturing in biomechanics and biomedical engineering

AULA 7

CHAIR: Emanuela Bologna

	Title	Author(s)	Speaker
16:20	A workflow for crystallinity prediction of 3D printed poly-ether-ether-ketone	Francesca Rotini	Francesca Rotini
16:40	Influencing parameters of additive manufacturing on the viscous encapsulation phenomena of PLA-PCL blending	Fabiana Amiri , Pierpaolo Fucile, Gianmarco Nuzzo, Massimiliano Zingales, Lorenzo Moroni	Fabiana Amiri
17:00	Phase transformation in the presence of anomalous heat transfer: a fractional order theory	Gianmarco Nuzzo, Fabiana Amiri, Emanuela Bologna, Massimiliano Zingales	Gianmarco Nuzzo

17:20	The free energy function for advanced manufactured materials	Emanuela Bologna, Gaia Prezioso, Massimiliano Zingales	Gaia Prezioso
17:40	Comparison of three design of customized stent-graft for AAA realized in additive manufacturing.	Sara Ragusa, Katia Siciliano, Emanuela Bologna, Massimiliano Zingales, Felice Pecoraro	Sara Ragusa
18:00	Polysaccharide-based bio-ink for 3D printing of scaffolds for cartilage reconstruction	Emanuela Muscolino, Simona Galvano, Anna Barbara Di Stefano, Francesca Toia, Maria Antonietta Sabatino, Marco Trapani, Francesco Moschella, Adriana Cordova, Daniela Giacomazza, Clelia Dispenza	Emanuela Muscolino
18:20	Bio-Inspired Parametric Design of Graded Cell Size Primitive based in B-Spline Interpolation	Massimo Cuomo, Golshan Farzi	Golshan Farzi
Junior MS08 - Recent advances in Structural Health Monitoring and Structural vibration control			<i>AULA 4</i>
CHAIRS: Chiara Masnata, Salvatore Russotto			
	Title	Author(s)	Speaker
16:20	Innovative passive structural control systems including a nonlinear fluid inerter: an experimental-numerical study	Miriam Chillemi, Thomas Furtmüller, Christoph Adam, Antonina Pirrotta	Miriam Chillemi
16:40	Numerical Modelling and Experimental Analysis on a Scaled Unreinforced Masonry Building	Mariagrazia Elena Alberti, Francesco Lo Iacono, Giuseppe Mugnos, Giacomo Navarra	Mariagrazia Elena Alberti
17:00	Sensitivity Analysis on a Novel Continuous Particle Swarm Optimization Algorithm for EMA Model Updating	Giuseppe Mugnos, Francesco Lo Iacono, Giacomo Navarra, Angela Ricciardello	Giuseppe Mugnos
17:20	Structural vibration control through Sliding Tuned Liquid Column Damper: an experimental study	Chiara Masnata, Salvatore Dario Di Trapani, Antonina Pirrotta	Salvatore Dario Di Trapani

17:40	Operational Modal Analysis of quasi-periodic multi-span bridges: a model-based approach for Hierarchical Clustering	Elisa Tomassini, Enrique García-Macías, Edwin Reynders, Filippo Ubertini	Elisa Tomassini
Junior MS09 - Generative Design strategies and applications in the Architecture, Engineering, and Construction Industry			<i>AULA 4</i>
CHAIRS: Laura Sardone, Beibei Xiong			
	Title	Author(s)	Speaker
18:00	Development of a low-cost Vehicle-Bridge Interaction based approach for the structural modal identification of a bridge	Dario Fiandaca	Dario Fiandaca
18:20	Bridge model updating by parametric design and SHM	Rebecca Asso, Pietro Palumbo, Luis Bohorquez, Valentina Boretti, Luigi Liberti, Davide Masera	Rebecca Asso
18:40	Parametric optimization of steel truss structures using cutting Stock Problem (CSP)	Raffaele Cucuzza, Giuseppe Carlo Marano, Marco Rosso, Luca Martinelli	Raffaele Cucuzza
19:00	Parametric design for an accurate and cost-effective Civil Engineering	Pietro Palumbo, Rebecca Asso, Luis Bohorquez, Luigi Liberti, Valentina Boretti, Davide Masera	Rebecca Asso

Tuesday - August 29, 2023

SESSION 7

Aula Magna Business School Building 13

	Title	Speaker
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09:15 - 09:55

[Plenary Lecture: Nano-Scale Mechanical Systems:Recent Trends in Nano-Structural Mechanics](#)

Raimondo Luciano

10:00 - 11:00 SESSION 8

BUILDING 19

**MS01 - 20(20)23 Stochastic Mechanics & Meccanica Stocastica 20(20)23
International Conference (23SM&MS23)
in honor of Emeritus Professor Mario Di Paola**

AULA 5

CHAIRS: Vittorio Gusella, Giuseppe Marano, Giuseppe Muscolino, Antonina Pirrotta

	Title	Author(s)	Speaker
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10:00

[Efficient Stochastic Response Determination of Nonlinear Systems By Leveraging the Unique Extrapolation Capabilities of the Wiener Path Integral Technique](#)

Ilias Mavromatis, Ioannis Kougoumtzoglou

Ilias Mavromatis

10:20

[A Wiener Path Integral Formalism for Treating Nonlinear Systems with Non-Markovian Response Processes](#)

Ilias Mavromatis, Apostolos Psaros, Ioannis Kougoumtzoglou

Ioannis Kougoumtzoglou

10:40

[Estimation of Evolutionary Power Spectra of Univariate Stochastic Processes by Energy-Based Reckoning](#)

Hanshu Zhang, Qingxia Yue, Alberto Di Matteo, Pol D. Spanos

Alberto Di Matteo

MS02 - Linear and Nonlinear Vibrations of Systems in honor of Emeritus Professor Fabrizio Vestroni

AULA 2

CHAIRS: Marco Amabili, Walter Lacarbonara, Francesco Pellicano

	Title	Author(s)	Speaker
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10:00 Prelude

10:20

[An efficient performance-based design optimization approach for nonlinear systems subject to non-stationary excitation via arbitrary polynomial chaos expansion](#)

Ketson R. M. dos Santos, André T. Beck, Rafael H. Lopez

Ketson R. M. dos Santos

10:40

[Transverse and axial vibrations of masonry beams: nonlinear interactions](#)

Maria Girardi

Maria Girardi

	MS06 - Industrial Hydraulics		<i>AULA 10</i>
	<i>CHAIRS: V. Armenio, B. Brunone, A. Carravetta, M. De Marchis, O. Giustolisi, S. Malavasi</i>		
	Title	Author(s)	Speaker
10:00	Behaviour of complex systems under random damage	Lorenza Abbracciavento, Valerio De Biagi	Lorenza Abbracciavento
10:20	The effect of different turbulence model on the hydroacoustic of a pump.	Renato Montillo, Armando Carravetta, Oreste Fecarotta	Renato Montillo
10:40	Effects of compressibility and cavitation on flow reattachment in orifice plates	Luca Nicola Quaroni, Stefano Malavasi	Stefano Malavasi
	MS10 - Modeling and performance assessment of bridges		<i>AULA Seminari A</i>
	<i>CHAIRS: Alessandro Contento, Angelo Aloisio, Junqing Xue, Giuseppe Quaranta, Paolo Gardoni, Bruno Briseghella</i>		
	Title	Author(s)	Speaker
10:00	Vehicle-bridge dynamics during braking	Angelo Aloisio, Alessandro Contento, Giuseppe Quaranta	Alessandro Contento
10:20	Formulation of a fiber beam element based on plastic damage models for prestressed concrete bridges	Luca Parente, Daniela Addressi, Enrico Spacone	Luca Parente
10:40	Bridge-Vehicle Interaction for Dislocating of Electrical Conduits	Fangyin Zhang, Zhi Zhang, Liling Cao	Zhi Zhang
	MS15 - Recent advances in input motion modelling for the design of earthquake-resistant systems		<i>AULA Seminari B</i>
	<i>CHAIRS: Alessandro Palmeri, Giuseppe Muscolino, Federica Genovese</i>		
	Title	Author(s)	Speaker
10:00	Filter equations for simulation of ground motion of multi-layered soil model	Rossella Laudani	Rossella Laudani
10:20	Effect of vertical acceleration component on the seismic performance of an earth dam	Andrea Nardo, Giovanni Biondi, Ernesto Cascone	Andrea Nardo
10:40	Accounting for earthquake- and environmentally-induced damage accumulation in single-building loss assessment	Kenneth Otárola, Leandro Iannacone, Roberto Gentile, Carmine Galasso	Kenneth Otárola
	MS16 - Multiscale Mechanics and Nanostructures		<i>AULA 7</i>
	<i>CHAIRS: Ada Amendola, Raffaele Barretta, Fernando Fraternali, Antonina Pirrotta</i>		
	Title	Author(s)	Speaker
10:00	Vibration problems in the coupled theory of triple porosity thermoelastic materials	Merab Svanadze	Merab Svanadze
10:20	Closed form solution of the elastoplastic constitutive problem in three-dimensional continua	Fabio De Angelis	Fabio De Angelis
10:40	Nonlinear Phenomena in Electrically Coupled MEMS resonators	Hassen Ouakad, Ayman Al- Naimi	Hassen Ouakad

MS24 - Recent advances, applications and challenges of coupled free flow and porous media flow systems

AULA 3

CHAIRS: Martin Schneider, Holger Class, Rainer Helmig, Costanza Aricò, Donatella Termini

	Title	Author(s)	Speaker
10:00	A CFD-based analysis on the effects of bundle porosity in regularly packed hollow fiber membrane contactors	Nunzio Cancilla, Luigi Gurreri, Michele Ciofalo, Andrea Cipollina, Alessandro Tamburini, Giorgio Micale	Nunzio Cancilla
10:20	Drag reduction on porous coated cylinders invested by a fluid	Daniele Puleo, Calogero Picone, Costanza Aricò	Costanza Aricò
10:40	A study on permeability in Portland pastes with high water-cement ratio	Roberto Serpieri, Michela Monaco	Roberto Serpieri

MS26 - Innovations in Biomechanics and Bio-Inspired Engineering

AULA 9

CHAIRS: Marco Amabili, Emanuela Bologna, Massimiliano Zingales

	Title	Author(s)	Speaker
10:00	Complex biomechanics: from atoms to patients	Christian Hellmich, Johannes Kalliauer, Niketa Ukaj, Stefan Scheiner	Christian Hellmich
10:20	Mechanical validation of meniscal tissue contrast enhancement micro-CT protocols	Gregorio Marchiori, Melania Maglio, Gianluca Giavaresi, Giorgio Cassiolas, Gaia Prezioso, Massimiliano Zingales	Gregorio Marchiori
10:40	Proof-of-concept of a new tonometer based on solitary waves	Madison Hodgson, Piervincenzo Rizzo, Samuel Dickerson	Piervincenzo Rizzo

MS29 - Bio-fluid mechanics

AULA 4

CHAIRS: Valerio Caleffi, Giorgio Querzoli, Jan O. Pralits, Rodolfo Repetto, Annunziato Siviglia, Francesca Maria Susin

	Title	Author(s)	Speaker
10:00	Modeling the effects of orthostatic stress on a global multiscale cardiovascular model	Chiara Colombo, Lucas Omar Müller, Annunziato Siviglia	Chiara Colombo
10:20	Analysis of the thromboembolic risk in the left atrial appendage under atrial fibrillation through a fluid-structure interaction numerical approach	Giulio Musotto, Alessandra Monteleone, Danila Vella, Ruggero Cannova, Bernardo Zuccarello, Andrew Cook, Giorgia Maria Bosi, Gaetano Burriesci	Giulio Musotto
10:40	A monophasic fluid-structure interaction approach for cardiovascular applications	Alessandra Monteleone, Sofia Di Leonardo, Alessia Viola, Enrico Napoli, Gaetano Burriesci	Alessandra Monteleone

MS31 - Multiscale and Multiphysics Modelling for 'Complex Materials' (MMCM18)

AULA 6

CHAIRS: Marco Pingaro, Patrizia Trovalusci, Emanuele Reccia, Greta Ongaro

	Title	Author(s)	Speaker
10:00	A fast adaptive PD-FEM coupling model for predicting cohesive crack growth	Reza Alebrahim, Sonia Marfia	Sonia Marfia
10:20	Implementation of higher order kinematics using isogeometric analysis for curvilinear fibre composites	Trilok M Shende, Devesh Punera	Devesh Punera
10:40	Parallel, high-performance Uneyama-Doi model for analyzing diblock copolymer and solvent mixtures using semi-implicit Fourier spectral method	Farshid Mossaiby, Arman Shojaei, Gregor Ibbeken, Christian Cyron, Marcus Müller	Farshid Mossaiby

11:00 - 11:40 Coffee break

11:40 - 12:40 SESSION 9

BUILDING 19

MS01 - 20(20)23 Stochastic Mechanics & Meccanica Stocastica 20(20)23**International Conference (23SM&MS23)**

AULA 5

in honor of Emeritus Professor Mario Di Paola**CHAIRS: Vittorio Gusella, Giuseppe Marano, Giuseppe Muscolino, Antonina Pirrotta**

	Title	Author(s)	Speaker
11:40	A perspective on conditional spectrum-based determination of response statistics of nonlinear systems: stationary and non-stationary cases	Pol D. Spanos, Beatrice Pomaro	Beatrice Pomaro
12:00	Prediction via Gaussian Process of moment quantities of an offshore wind turbine using operational SCADA data	Bridget Moynihan, Eleonora Maria Tronci, Babak Moaveni, Finn Rüdinger, Ross, Eric Hines	Eleonora M. Tronci
12:20	Mesoscale random behavior of concrete-earth material: from CT to numerical modelling	Francesco Faralli, Federico Cluni, Vittorio Gusella	Francesco Faralli

MS06 - Industrial Hydraulics

AULA 10

CHAIRS: V. Armenio, B. Brunone, A. Carravetta, M. De Marchis, O. Giustolisi, S. Malavasi

	Title	Author(s)	Speaker
11:40	Acoustic response of a vibrating elongated cylinder in a hydrodynamic turbulent flow	Giacomo Rismondo, Marta Cianferra, Vincenzo Armenio	Vincenzo Armenio
12:00	Analytical model of an OWC embedded in a large floating circular platform	Antonino Simone Spanò, Giovanni Malara, Felice Arena	Antonino Simone Spanò

MS09 - Uncertainty Quantification, reliability and sensitivity analysis under limited data			<i>AULA 8</i>
CHAIRS: Alba Sofi, David Moens, Edoardo Patelli, Matthias Faes, Michael Hanss			
	Title	Author(s)	Speaker
11:40	Predicting the burst strength of composite pressure vessels through machine learning	Rafael Santos, Dirk Vandepitte, David Moens	Rafael Santos
12:00	Application of unsupervised machine learning algorithms on determining the rate of random impulses forcing an oscillator	Przemysław Frankiewicz, Natalia Frankowska, Marek Sulewski, Agnieszka Ozga	Przemysław Frankiewicz
12:20	Bootstrapping-based determination of power spectral density intervals from limited data	Marco Behrendt, Chao Dang, Michael Beer	Marco Behrendt
MS15 - Recent advances in input motion modelling for the design of earthquake-resistant systems			<i>AULA Seminari B</i>
CHAIRS: Alessandro Palmeri, Giuseppe Muscolino, Federica Genovese			
	Title	Author(s)	Speaker
11:40	A New Correlation Structure for the Wavelet-Based Stochastic Generation of Fully Non-Stationary Artificial Accelerograms	Federica Genovese, Alessandro Palmeri	Federica Genovese
12:00	Closed-form solutions for the spectral characteristics of the stochastic response of linear systems subjected to fully non-stationary excitations consistent with target seismic accelerograms	Federica Genovese, Giuseppe Muscolino	Giuseppe Muscolino
12:20	Wavelet-Based Generation of Ensemble of Ground Motions Compatible with a Probabilistic Target Response Spectrum	Suparno Mukhopadhyay, Sandip Das, Vinay K. Gupta	Suparno Mukhopadhyay
MS16 - Multiscale Mechanics and Nanostructures			<i>AULA 7</i>
CHAIRS: Ada Amendola, Raffaele Barretta, Fernando Fraternali, Antonina Pirrotta			
	Title	Author(s)	Speaker
11:40	Perturbations for static problems of Timoshenko beams of local/non-local mixture	Giuseppe Ruta, Ugurcan Eroglu	Ugurcan Eroglu
12:00	Local-nonlocal stress-driven model for multi-cracked shear deformable nanobeams	Andrea Caporale, Raimondo Luciano	Andrea Caporale
12:20	Nonlocal gradient bending of elastic nanobeams for piecewise regular fields	Marzia Sara Vaccaro, Raffaele Barretta, Andrea Caporale, Raimondo Luciano	Marzia Sara Vaccaro

MS24 - Recent advances, applications and challenges of coupled free flow and porous media flow systems			<i>AULA 3</i>
<i>CHAIRS: Martin Schneider, Holger Class, Rainer Helmig, Costanza Aricò, Donatella Termini</i>			
	Title	Author(s)	Speaker
11:40	A fully implicit coupled pore-network/free-flow model for the pore-scale simulation of drying processes	Anna Mareike Kostelecky, Martin Schneider, Maziar Veyskarami, Hanchuan Wu	Rainer Helmig
12:00	Control-Volume Finite-Element Schemes for Coupling Free Flow with Porous-Medium Flow	Martin Schneider, Edward Coltman, Timo Koch, Rainer Helmig	Martin Schneider
12:20	Gravel bed rivers: bed roughness structure and interface flow characterization	Donatella Termini, Federica Lavignani	Federica Lavignani
MS26 - Innovations in Biomechanics and Bio-Inspired Engineering			<i>AULA 9</i>
<i>CHAIRS: Marco Amabili, Emanuela Bologna, Massimiliano Zingales</i>			
	Title	Author(s)	Speaker
11:40	Predicting the growth of wood structures based on a micromechanics-informed beam model	Antonia Wagner, Stefan Scheiner	Stefan Scheiner
12:00	Anomalous diffusion of membrane receptors in endocytosis process	Gianmarco Nuzzo, Mario Argenziano, Emanuela Bologna, Massimiliano Zingales	Gianmarco Nuzzo
12:20	Some insights into caterpillar's locomotion for soft robots applications	Mario Argenziano, Massimiliano Fraldi, Massimiliano Zingales	Mario Argenziano
MS29 - Bio-fluid mechanics			<i>AULA 4</i>
<i>CHAIRS: Valerio Caleffi, Giorgio Querzoli, Jan O. Pralits, Rodolfo Repetto, Annunziato Siviglia, Francesca Maria Susin</i>			
	Title	Author(s)	Speaker
11:40	Eulerian and Lagrangian analysis of stented coronary flow	Paolo Peruzzo, Chiara Conforto, Francesca Maria Susin, Stefano Lanzoni	Paolo Peruzzo
12:00	Flow dynamics of silicone oil tamponade in steady and unsteady conditions	Pier Giuseppe Ledda, Federico Angius, Maria Grazia Badas, Tommaso Rossi, Giorgio Querzoli	Pier Giuseppe Ledda
12:20	On the comparison between the airflow in pre- and post-surgery nasal anatomies via Computational Fluid Dynamics (CFD)	Eric Segalerba, Jan Oscar Pralits, Maurizio Quadrio	Eric Segalerba

MS31 - Multiscale and Multiphysics Modelling for 'Complex Materials' (MMCM18) AULA 6**CHAIRS: Marco Pingaro, Patrizia Trovalusci, Emanuele Reccia, Greta Ongaro**

	Title	Author(s)	Speaker
11:40	On XFEM modelling of static crack propagation in brittle micropolar elastic plates based on linear elastic fracture mechanics (LEFM)	Meral Tuna, Patrizia Trovalusci, Marco Pingaro, Nicholas Fantuzzi	Meral Tuna
12:00	Reinforced Concrete Slab Panels under Oblique Projectile Impact- Numerical Study	Roouf Un Nabi Dar, Dr. P. Alagappan	Roouf Un Nabi Dar
12:20	Printable beam-based lattices: A novel geometry generation algorithm and thermo-mechanical characterization via Asymptotic Homogenization	Francesco De Canio, Patrizia Trovalusci, Marco Pingaro	Francesco De Canio

MS04 - First new science, on the resistance of solid bodies to be broken. A mini-symposium in honor of Roberto Ballarini on the occasion of his 65th birthday AULA 2**CHAIRS: Jia-Liang Le, Gianni Royer-Carfagni**

	Title	Author(s)	Speaker
11:40	Analytical multi-shape composite mechanics: going beyond the limits of Mori-Tanaka homogenization	Nabor Jimenez Segura , Bernhard Pichler, Christian Hellmich	Christian Hellmich
12:00	A dynamically reprogrammable surface with self-evolving shape morphing	Yonggang Huang	Yonggang Huang
12:20	Modelling Uniaxial Compressive Fracture of Concrete with Nonlocal Macro-Meso-Scale Consistent Damage Model	Yudong Ren, Jianbing Chen, Guangda Lu	Yudong Ren

MS40 - Innovations in Structural Dynamics Models and Experiments AULA Seminari A**CHAIRS: Giovanni Fabbrocino, Giacomo Navarra, Massimiliano Giofrè, Francesco Lo Iacono, Stefano Ercolessi**

	Title	Author(s)	Speaker
11:40	Virtual dynamic tests on soil-structure interaction data-driven assessment using HPC resources	Tony Fierro, Stefano Ercolessi, Giovanni Fabbrocino, Filippo Santucci de Magistris, Carlo Rainieri	Tony Fierro
12:00	Sensitivity of displacement measures in detecting damages induced by shaking table tests on masonry barrel vaults with hemp bio composite strengthening	Elena Alberti, Massimiliano Giofrè, Francesco Lo Iacono, Giacomo Navarra, Maria Oliva, Chiara Pepi	Francesco Lo Iacono
12:20	Evaluation of cracks in masonry arches with Artificial Neural Networks.	Antonino Iannuzzo, Vincenzo Musone, Danilo Di Giacinto, Eugenio Ruocco	Eugenio Ruocco

12:40 - 14:20 Lunch

14:20 - 16:40 SESSION 10

BUILDING 19

**MS01 - 20(20)23 Stochastic Mechanics & Meccanica Stocastica 20(20)23
International Conference (23SM&MS23)
in honor of Emeritus Professor Mario Di Paola**

AULA 5

CHAIRS: Vittorio Gusella, Giuseppe Marano, Giuseppe Muscolino, Antonina Pirrotta

	Title	Author(s)	Speaker
14:20	Probabilistic Response of Rigid Foundations on Uniform Soil with Uncertain Shar-Wave Velocities Under Horizontal Vibrations	Jun-Yang Shi	Jun-Yang Shi
14:40	Probabilistic response determination of high-dimensional nonlinear systems enforced by multiple Poisson white noises	Jian-Bing Chen, Meng-Ze Lyu	Meng-Ze Lyu
15:00	Generalized complex fractional moment for the probabilistic characteristic of random vectors	Lizhi Niu, Mario Di Paola, Wei Xu, Antonina Pirrotta	Lizhi Niu
15:20	A Bayesian approach for tie rod tensile force identification	Chiara Pepi, Massimiliano Gioffrè	Chiara Pepi
15:40	Probabilistic modelling of hemp ropes strength	Maria Eleonora Pipistrelli, Massimiliano Gioffrè, Mircea Dan Grigoriu	Maria Eleonora Pipistrelli
16:00	Integer- and non-integer-order filter approximations for determining the stochastic response of wind-excited structural systems	Luca Roncallo, Ilias Mavromatis, Ioannis A. Kougioumtzoglou, Federica Tubino	Luca Roncallo
16:20	An adaptive Kriging-based approach for random vibration analysis of the freight wagon-turnout system	Jun Lai, Yan Shi, Jingmang Xu, Ping Wang, Michael Beer	Jun Lai

**MS02 - Linear and Nonlinear Vibrations of Systems in honor of Emeritus Professor
Fabrizio Vestroni**

AULA 2

CHAIRS: Marco Amabili, Walter Lacarbonara, Francesco Pellicano

	Title	Author(s)	Speaker
14:20	Stick-slip and Fully-stuck motion regimes: can frictional nonlinearity enhance damage detection?	Giancarlo Santamato, Massimiliano Solazzi, Antonio Frisoli	Giancarlo Santamato
14:40	Effect of pre-existing crack on the negative stiffness characteristics of thermally actuated bistable composite laminate	Amar Nath Roy Chowdhury, Suraj K Singh	Amar Nath Roy Chowdhury
15:00	Vibrations of shells interacting with a Non-Newtonian fluid	Francesco Pellicano	Francesco Pellicano
15:20	Non-linear metamaterials for shock absorption and locomotion	Andrea Colombi, Bao Zhao	Andrea Colombi

15:40	Hysteretic Tuned Mass Damper for seismic protection: Experimental investigation and Numerical modelling	Pranath Kumar Gourishetty, Vinay Yadav Janga, Biagio Carboni, Giuseppe Quaranta, Walter Lacarbonra	Pranath Kumar Gourishetty
16:00	Exploiting global nonlinear dynamics of mechanical systems and structures	Giuseppe Rega	Giuseppe Rega
MS03 - Damaged elements and structures: models, resolution techniques, detection devices, experimental approaches			<i>AULA Seminari B</i>
CHAIRS: Uğurcan Eroğlu, Giuseppe Ruta			
	Title	Author(s)	Speaker
14:20	Optimal Control of a Swarm of Sensors for Structural Health Monitoring	Luigi Severa, Silvia Milana, Nicola Roveri, Antonio Culla, Antonio Carcaterra	Luigi Severa
14:40	Vibration of shallow arches with an edge crack	Ugurcan Eroglu, Giuseppe Ruta, Ekrem Tüfekci	Giuseppe Ruta
15:00	Numerical modelling of a benchmark wind turbine blade and damage detection from experimental benchmark data	Mohamed Sajeer Modamangalavan, Aniruddha Das, Dhiraj Ghosh, Adrita Kundu, Suparno Mukhopadhyay, Satish Nagarajaiah	Mohamed Sajeer Modamangalavan
15:20	On the Use of Bartlett and MVDR Beamformers in Damage Identification by Modal Curvature Variations	Ugurcan Eroglu, Annamaria Pau	Ugurcan Eroglu
15:40	SmartRail: a system for the continuous monitoring of the track geometry based on embedded arrays of fiber optic sensors	Giancarlo Santamato, Lorenzo Tozzetti, Massimiliano Solazzi, Fabrizio Di Pasquale, Gianluca De Vita, Mirko Ermini, Eugenio Fedeli, Stefano Faralli	Giancarlo Santamato
16:00	Waste Feather Fibre Reinforcement for Cement-Based Materials	Ruben Paul Borg, Elizabeth Spiteri Cornish, Everaldo Attard	Elizabeth Spiteri Cornish
16:20	Surface Erosion of Structured Coatings of Wind Turbine Blades: Computational Analysis	Leon Mishnaevsky Jr.	Leon Mishnaevsky Jr.

MS09 - Uncertainty Quantification, reliability and sensitivity analysis under limited data

AULA 8

CHAIRS: Alba Sofi, David Moens, Edoardo Patelli, Matthias Faes, Michael Hanss

	Title	Author(s)	Speaker
14:20	Dynamic Reliability Analysis of Large-Span Structures under Human Activities Considering the Uncertainties on Human-Structure Coupling System	Dongjun Zeng, Haoqi Wang	Haoqi Wang
14:40	First-passage reliability analysis of high-dimensional nonlinear systems involving randomness from both parameters and excitations	Meng-Ze Lyu, Jian-Bing Chen	Meng-Ze Lyu
15:00	Static analysis of steel frames with semi-rigid connections in the presence of interval uncertainties	Federica Genovese, Alba Sofi	Federica Genovese
15:20	Inverse Uncertainty Quantification using Likelihood-free Inference for Automotive Passive Safety	Maternus Herold	Maternus Herold
15:40	Bayesian Updating of Overall Failure Probability Based on Gauss-Legendre Numerical Integration and Information Reuse	Pei-Pei Li, Matthias G.R. Faes, Marcos A. Valdebenito, Matteo Broggi	Pei-Pei Li
16:00	Analytical solution for non-stationary response of 1/2-order fractional linear stochastic MDOF dynamical systems	Yi-jian Xu, Fan Kong, Ren-jie Han	Fan Kong

MS16 - Multiscale Mechanics and Nanostructures

AULA 7

CHAIRS: Ada Amendola, Raffaele Barretta, Fernando Fraternali, Antonina Pirrotta

	Title	Author(s)	Speaker
14:20	On the use of fractal geometry for the design of tensegrity braces	Julia de Castro Motta, Baidehi Das, Ada Amendola, Julian Rimoli, Fernando Fraternali	Baidehi Das
14:40	A multiscale approach to design of seismic metaisolators	Valentina Adinolfi, Saeedeh Qaderi, Giovanni Germano, Julia de Castro Motta, Gianmario Benzoni, Ada Amendola, Massimo Ruzzene, Fernando Fraternali	Valentina Adinolfi
15:00	Twisted nanobeams on rotation-driven nonlocal foundations	Marzia Sara Vaccaro, Raffaele Barretta, Raimondo Luciano, Francesco Marotti de Sciarra	Marzia Sara Vaccaro

15:20	Application of the surface stress-driven nonlocal theory of elasticity for the study of the bending response of FG cracked nanobeams	Giuseppe Lovisi	Giuseppe Lovisi
15:40	Clustered cable-actuation strategies of a family of V-Expander tensegrity cells	Chen, Fraddosio, Micheletti, Pavone, Piccioni. Skelton	Gaetano Pavone
16:00	On the effect of carbon nanotubes in Ultra-High Performance Fibers Reinforced Concrete: preliminary results.	Annavirginia Lambiase, Luciano Feo, Giuseppe Lovisi, Enzo Martinelli, Marco Pepe, Rosa Penna	Annavirginia Lambiase
16:20	Characterization of viscoelastic 3D printed truss-based metamaterials under impact loading	Kaoutar Radi, Lukas Morf, Dennis M. Kochmann	Dr. Kaoutar Radi
MS22 - Multi-scale and multi-field interface mechanics: modeling, computation and experimental aspects			AULA 9
CHAIRS: Michele Serpilli, Raffaella Rizzoni, Maria Letizia Raffa, Frédéric Lebon, Reinaldo Rodríguez-Ramos			
	Title	Author(s)	Speaker
14:20	An axisymmetric problem for a nano-sized material surface on a boundary of an elastic semi-space	Anna Zemlyanova	Anna Zemlyanova
14:40	Stability during fracture-like nucleation in frictional sliding	David Kammer, Gabriele Albertini, Miguel Castellano, Flavio Lorez	David Kammer
15:00	Modelling damage in adhesive joints via asymptotic methods	Maria Letizia Raffa, Raffaella Rizzoni, Frédéric Lebon, Michele Serpilli, Reinaldo Rodríguez-Ramos	Maria Letizia Raffa
15:20	Non-linear analysis of quasi-brittle materials through a FEM-VEM approach	Giuseppe Giambanco, Marianna Puccia, Elio Sacco, Antonino Spada	Antonino Spada
15:40	Numerical modeling of thermoelastic nanocomposites	Fahmi Grine, Ludovic Cauvin, Delphine Brancherie, Djimédo Kondo	Fahmi Grine
16:00	Asymptotic behaviour of micro-scale adhesively bonded joints based on strain gradient elasticity	Michele Serpilli, Raffaella Rizzoni, Frédéric Lebon, Maria-Letizia Raffa, Reinaldo Rodríguez-Ramos	Michele Serpilli
16:20	Concentration tensors in micropolar periodic laminates with imperfect interfaces	Raffaella Rizzoni, Michele Serpilli, Reinaldo Rodríguez-Ramos, Frédéric Lebon, Yoanh Espinosa-Almeyda, Maria Letizia Raffa	Raffaella Rizzoni

MS23 - Structural health monitoring for urban and extra-urban environments

AULA 10

CHAIRS: Michele Betti, Nicola Cavalagli, Francesco Clementi, Ernesto Grande

	Title	Author(s)	Speaker
14:20	Monitoring of trees in urban areas for the assessment of the global stability and the evaluation of the efficacy of safeguard interventions	Andrea Santacroce, Raffaella Franceschini, Ernesto Grande	Ernesto Grande
14:40	Output-only tree dynamic experimental investigation	Giacomo Zini, Gianni Bartoli, Michele Betti, Francesco Clementi, Luca Facchini, Francesco Ferrini, Andrea Giachetti, Ernesto Grande	Michele Betti
15:00	Rapid Assessment of Serviceability Requirements for Buildings under Geothermally Induced Micro-seismic Events	Aditi Kumawat	Aditi Kumawat
15:20	Integrated 3D-Printed components for monitoring cultural heritage	Michele Arturo Caponero, Ernesto Grande, Maura Imbimbo, Valentina Tomei	Ernesto Grande
15:40	A novel mode shape identification approach for operational modal analysis of structures	Domenico Camassa, Anna Castellano, Aguinaldo Fraddosio, Mario Daniele Piccioni	Domenico Camassa
16:00	Low-Cost Vibration Monitoring for Anomaly Detection and Localization on Masonry Towers	Francesca Bianconi, Gianluca Standoli, Mattia Schiavoni, Francesco Clementi	Francesco Clementi

MS25 - Mechanics and Physics of Granular Materials and Systems

AULA 3

CHAIRS: Marcial Gonzalez, Mahdia Hattab, Anil Misra, Anthony D. Rosato, Erick Franklin

	Title	Author(s)	Speaker
14:20	Dunes interacting with obstacles	William Righi Assis, Danilo da Silva Borges, Erick Franklin	William Righi Assis
14:40	The cooperative nature of the motion of sets of intruders moving amid grains	Douglas Carvalho, Erick Franklin	Douglas Carvalho
15:00	Cratering by the impact of aggregates	Erick Franklin, Douglas Carvalho, Nicolao Lima	Erick Franklin
15:20	Multi-scale investigation of clay behaviour related to particle structuring	Mengyu MA, Hakim NAOUI, Fares BENNAI, Mahdia HATTAB, Pierre- Yves HICHER	Mengyu MA

15:40	Granular-based continuum elasto-plastic–damage variational formulation for strain gradient solids	Luca Placidi, Anil Misra, Francesco dell'Isola, Emilio Barchiesi, Erden Yıldızdağ, Valerii Maksimov, Dmitry Timofeev, Nurettin Yilmaz, Abdou Kandalajt	Luca Placidi
16:00	Effects of Graphene Nanoplatelets on Rheological and Mechanical Properties of 3D Printed Cementitious Composites	Ugur Kilic, Mahyar Ramezani, Muhammad M. Sherif, Osman E. Ozbulut	Osman E. Ozbulut
16:20	Identification of kaolinite fabric – 3D reconstruction from SEM-FIB images	Fares Bennai, Ismail Myouri, Julien Guyon, Mahdia Hattab	Fares Bennai
MS32 - Sustainable mobility			<i>AULA 4</i>
CHAIR: Rosario Miceli			
	Title	Author(s)	Speaker
14:20	A simulation-based study to assess safety and performance efficiency of Traffic Calming Measures combined with Connected and Automated Vehicle Technologies	Maria Luisa Tumminello, Elżbieta Macioszek , Anna Granà , Tullio Giuffrè	Maria Luisa Tumminello
14:40	Walking to access shared mobility services: a case study in Palermo, Italy	Gabriele D'Orso, Marco Migliore	Gabriele D'Orso
15:00	Performance Analysis of a Cascaded H-Bridge Multilevel Inverter in Asymmetric Configuration	Massimo Caruso, Antonino Oscar Di Tommaso, Gerlando Frequente, Rosario Miceli, Gioacchino Scaglione, Nicola Campagna	Gerlando Frequente
15:20	Comparison between Voltage Oriented Control and Synchronous Power Control for Grid-Connected Inverter Applications	Antonino Oscar Di Tommaso, Rosario Miceli, Giuseppe Sorrentino, Giuseppe Schettino, Claudio Nevoloso, Gioacchino Scaglione, Nicola Campagna	Giuseppe Sorrentino
15:40	Development of a Decision Support System for increasing the resilience of urban road network	Giuseppe Salvo, Luigi Sanfilippo	Luigi Sanfilippo

MS35 - Challenges and emerging trends in vibration mitigation**AULA 1****CHAIRS: Giuseppe Failla, Roberta Santoro**

	Title	Author(s)	Speaker
14:20	Effectiveness of rubber bearings on the response of seismic isolation system in the case of vertical actions	Rossella Laudani, Giovanni Falsone	Rossella Laudani
14:40	Performance-based seismic design of self-centering dissipative braces for seismic retrofit of substandard reinforced concrete buildings	Dario De Domenico, Alberto Gioitta, Antonino Recupero	Alberto Gioitta
15:00	A Floating Absorber for Motion Mitigation in Floating Wind Turbines	Giuseppe Failla, Gioacchino Alotta, Valentina Laface, Carlo Ruzzo, Felice Arena	Giuseppe Failla
15:20	Experimental investigation of surface wave propagation in locally resonant metamaterials	Farhad Zeighami, Antonio Palermo, Denis Bogomolov, Alessandro Marzani	Farhad Zeighami
15:40	Vibration mitigation in pipelines by resonant supports with inerter devices	Silvia Scutteri, Andrea Francesco Russillo, Roberta Santoro, Giuseppe Ricciardi, Giuseppe Failla	Silvia Scutteri
16:00	Architected plates based on the Schwarz primitive cell for elastic wave mitigation and guiding	Aida Hejazi Nooghabi, Henrik Thomsen, Andrea Colombi	Aida Hejazi Nooghabi

MS36 - Anti-Collapse Performance Evaluation and Reliability Improvement of Engineering Structures**AULA 6****CHAIRS: Youbao Jiang, Adhikari Sondipon, Yanchao Shi, Yi Li, Christoph Adam, Michele Barbato**

	Title	Author(s)	Speaker
14:20	Experimental investigation of progressive collapse of precast concrete beam-column assemblies using dry connections	Zidong Zhao, Xiaowei Cheng, Yi Li, Yi An	Zidong Zhao
14:40	Response of structures subjected to debris impact: a simplified model	Elahe Zeinali, Foad Kiakojouri, Valerio De Biagi	Elahe Zeinali
15:00	Seismic-collapse selective retrofitting using the Applied Element Method	Cosimo Pellicchia, Gian Paolo Cimellaro, Alessandro Cardoni, Ahmed Amir Khalil, Emiliano De Iuliis	Cosimo Pellicchia
15:20	Threat-dependent and Threat-independent Progressive Collapse Study: Analogy and Contrast in Methodology and Results	Foad Kiakojouri, Valerio De Biagi, Bernardino Chiaia	Foad Kiakojouri

15:40	Progressive collapse resistance mechanism and design method considering RC beams, floor slabs and infill walls	Shuang Li, Sidi Shan, Haoran Wang	Shuang Li
16:00	Multi-phase Image Degradation Modelling and Abnormal Detection based on Change-Point Spatio-Temporal Process (CP-STP)	Munwon Lim, Suk Joo Bae	Suk Joo Bae
16:20	Neural Network based reliability analysis of pipelines with randomly distributed internal corrosion	Michael Olatunde, Srinivas Sriramula, Amir Siddiq, Alfred Akisanya	Michael Olatunde
MS39 - Computational intelligence in structural engineering & structural optimization			<i>AULA Seminari A</i>
CHAIRS: Fabio Di Trapani, Josephine Voigt Carstensen, Cristoforo Demartino, Giuseppe Carlo Marano			
	Title	Author(s)	Speaker
14:20	A Graph Neural Network-Based Model for Elastic Structural Analysis	Ling-Han Song, Chen Wang, Jian-Sheng Fan	Ling-Han Song
14:40	Reliability-based sizing optimization of an exhibition center	Luca Rizzian, Mariapia Marchi	Luca Rizzian
15:00	Parametric design and structural optimization of arches with the Estimation of Distribution Algorithm (EDA)	Jonathan Melchiorre, Amedeo Manuello, Marco Martino Rosso, Vincenzo Morganti, Gabriele Rosi, Giuseppe Carlo Marano	Marco Martino Rosso
15:20	Reliability-based structural optimization framework for seismic retrofitting of non-ductile reinforced concrete frame structures	Antonio P. Sberna, Angshuman Deb, Fabio Di Trapani, Joel P. Conte	Antonio P. Sberna
15:40	Interpretable Machine-Learning Models for Damage Assessment and Predicting Maximum Displacements in RC Beams Under Impact Loading	Cristoforo Demartino, Dade Lai	Cristoforo Demartino
16:00	A derivative-free directionality-based paradigm for solving inverse problems: Application in structural engineering.	Saikat Sarkar	Saikat Sarkar
16:20	Reinforcement learning for the rational design of metamaterials: applications to wave control and energy harvesting	Luca Rosafalco, Jacopo Maria De Ponti, Luca Iorio, Richard V. Craster, Alberto Corigliano, Raffaele Ardito	Luca Rosafalco

16:40 - 17:00 Coffee break

17:00 - 18:20 SESSION 11

BUILDING 19

MS30 - Structural Monitoring and Identification of Complex Dynamical Systems		<i>AULA Seminari A</i>	
CHAIRS: Alberto Di Matteo, Kalil Erazo			
	Title	Author(s)	Speaker
17:00	System Identification and Model Updating of Cross-Laminated Timber Floating Floors	Thomas Furtmüller, Michael Kawrzra, Christoph Adam	Thomas Furtmüller
17:20	Structural identification of a hospital building under unknown excitation induced by air conditioning systems and elevators	Cecilia Rinaldi, Aliasghar Talebi, Francesco Potenza, Vincenzo Gattulli	Cecilia Rinaldi
17:40	A reliable low-cost structural health monitoring system based on Siemens IOT 2020	Francesco Maria Raimondi, Gaetano D'Alessandro, Francesco Oddo	Francesco Oddo
18:00	Truncated Unscented Kalman Filter for Incorporating Constraints in Joint State-Parameter Estimation	Adrita Kundu, Suparno Mukhopadhyay	Adrita Kundu
MS04 - First new science, on the resistance of solid bodies to be broken. A mini-symposium in honor of Roberto Ballarini on the occasion of his 65th birthday		<i>AULA 2</i>	
CHAIRS: Jia-Liang Le, Gianni Royer-Carfagni			
	Title	Author(s)	Speaker
17:00	Observing Fracture of Brittle Materials	Xiaoran Wang, Luigi Biolzi, Joseph Labuz	Joseph Labuz
17:20	Error-in-constitutive-relation framework for the characterization of viscoelastic solids	Bojan Guzina, Marc Bonnet, Prasannakumar Salasiya	Bojan Guzina
17:40	Generative AI for modeling earthquake damage	Vedhus Hoskere, Subin Varghese, Reza Bazrygary	Vedhus Hoskere
18:00	The mechanics of a photo induced hydrogel swimming robot	Chen Xuan	Chen Xuan
MS11 - Modeling and performance assessment of rocking elements		<i>AULA 5</i>	
CHAIRS: Alessandro Contento, Angelo Di Egidio, Danilo D'Angela, Gennaro Magliulo			
	Title	Author(s)	Speaker
17:00	Novel perspectives for developing rocking and overturning spectra associated with nonstructural elements housed in buildings	Danilo D'Angela, Gennaro Magliulo, Francesco Mario Calenzo	Danilo D'Angela
17:20	Visco-elastic coupling of rigid blocks subjected to seismic excitation	Alessandro Contento, Angelo Di Egidio	Alessandro Contento

17:40	Demand to capacity seismic assessment of unanchored building contents	Gennaro Magliulo, Danilo D'Angela, Francesco Mario Calenzo	Gennaro Magliulo
18:00	Peak rotation hazard-curve comparisons of alternative rocking modelling approaches	Christian Málaga-Chuquitaype	Christian Málaga-Chuquitaype
MS16 - Multiscale Mechanics and Nanostructures			<i>AULA 7</i>
CHAIRS: Ada Amendola, Raffaele Barretta, Fernando Fraternali, Antonina Pirrotta			
	Title	Author(s)	Speaker
17:00	An analytical approach to investigate the dynamics of time-modulated elastic metasurfaces	Antonio Palermo, Xingbo Pu, Alessandro Marzani	Antonio Palermo
17:20	Out-of plane behavior of single-layer graphene membrane: the interatomic potentials	Michele Curatolo, Giovanni Formica, Franco Milicchio, Ginevra Salerno	Michele Curatolo
17:40	Eigenfrequencies of a cantilever nanobeam with a tip point mass partially immersed in fluid	Ante Skoblar, Goranka Štimac Rončević, Marko Čanađija, Roberto Žigulić	Ante Skoblar
18:00	Structural Deterioration and Mechanical Degradation of Limestone Calcined Clay Cement (LC3) under Elevated Temperature	K.M.Liew, G. LI, Jinhua Sun, Venkatesh Kumar R. Kodur	G. LI
MS33 - A careful approach to the study and preservation of cultural heritage			<i>AULA 4</i>
CHAIRS: Delia Francesca Chillura Martino, Anna Maria Gueli			
	Title	Author(s)	Speaker
17:00	Deterioration Detection in tiles focusing on Historical Buildings in Portugal Based on Novel Deep Learning Methods	Narges Karimi, Mayank Mishra, Paulo B. Lourenço	Mayank Mishra
17:20	The HBIM process for the management of architectural heritage: geometric and material knowledge to develop an effective conservation and enhancement strategy	Manuela Aricò, Alessandra Ferro, Mauro Lo Brutto, Antonino Maltese, Gaspare Massimo Ventimiglia	Manuela Aricò
17:40	Pickering Emulsions Stabilized by Halloysite Nanotubes: a versatile starting material for geopolymers and coating layers preparation	Martina Maria Calvino, Lorenzo Lisuzzo, Giuseppe Cavallaro, Giuseppe Lazzara, Stefana Milioto	Martina Maria Calvino
18:00	Methodological approaches for underwater archeological metals investigation	Francesco Armetta, Maria Luisa Saladino	Francesco Armetta

MS35 - Challenges and emerging trends in vibration mitigation *AULA 1**CHAIRS: Giuseppe Failla, Roberta Santoro*

	Title	Author(s)	Speaker
17:00	Vibration Control and Fatigue Life Enhancement of Horizontal Axis Wind Turbine Blade Using Shape Memory Alloy Tendon	M Mohamed Sajeer, Arunasis Chakraborty	Mohamed Sajeer Modamangalavan
17:20	Flexural-torsional wave bandgaps in locally-resonant thin-walled beams	Andrea Burlon, Giuseppe Failla	Andrea Burlon
17:40	Experimental characterization and modelling of non-conventional TMD utilized for seismic retrofitting of existing structures	Michela Basili, Maurizio De Angelis	Michela Basili

MS41 - Emerging Mathematical Tools in Advanced Modelling: The Fractional-Order Calculus, in honor of Emeritus Professor Teodor Atanackovic *AULA 8**CHAIR: Massimiliano Zingales*

	Title	Author(s)	Speaker
17:00	Prelude		
17:20	Cyclic stress effect on the fractional poroviscoelastic model	Fabiana Amiri, Emanuela Bologna, Gianmarco Nuzzo, Massimiliano Zingales	Fabiana Amiri
17:40	The free energy function for non-linear hereditary materials	Emanuela Bologna, Gaia Prezioso, Massimiliano Zingales	Gaia Prezioso
18:00	Fractional equivalent linearization technique	Chiara Masnata, Antonina Pirrotta	Chiara Masnata

GENERAL SESSION 1 *AULA 6**CHAIRS: Lory Brady, Antonio Chella*

	Title	Author(s)	Speaker
17:00	Towards an ethically safe design of autonomous robots	Antonio Chella	Antonio Chella
17:20	Machine Learning Assisted Design of Honeycomb Lattices for Enhanced Energy Absorption and Failure Strength	Bhargav Reddy Isanaka, Tanmoy Mukhopadhyay, Rajendra Kumar Varma, Vinod Kushvaha	Bhargav Reddy Isanaka
17:40	Efficient 3D simulation of material microstructures via transfer learning	Lori Graham-Brady, Ashwini Gupta, Noah Wade	Lori Graham-Brady
18:00	Data-driven AI for the NDE of continuous welded rails	Piervincenzo Rizzo, Matthew Belding, Alireza Enshaeian	Piervincenzo Rizzo

GENERAL SESSION 2

AULA 9

CHAIRS: Michele Barbato, Fabio De Angelis

	Title	Author(s)	Speaker
17:00	Variational formulations in viscoplasticity with computational applications	Fabio De Angelis	Fabio De Angelis
17:20	Reissner's plate model by SGBEM indirect approach.	Terravecchia Silvio Salvatore, Zito Marianna	Terravecchia Silvio Salvatore
17:40	A manufacturing defects-based finite element modelling of curvilinear fibre composites	Prakash Chettri, Devesh Punera	Devesh Punera
18:00	Applicability of self-sensing capacity to the detection and evaluation of cracks on biomineralized-mediated self-healing cementitious composites	Naru Kim, Daeik Jang, H.K. Lee	Naru Kim

MS06 - Industrial Hydraulics

AULA 3

CHAIRS: V. Armenio, B. Brunone, A. Carravetta, M. De Marchis, O. Giustolisi, S. Malavasi

	Title	Author(s)	Speaker
17:00	How hole chamfer can affect perforated plates' fluid dynamic performance	Giacomo Ferrarese, Stefano Benzi, Marco Maria Agostino Rossi, Stefano Malavasi	Stefano Malavasi
17:20	Analysis and measurement of pressure and velocity in intermittent water distribution networks: a comparison between laboratory and numerical experiments.	Fabrizio Traina, Mauro De Marchis, Fulvio Lo Valvo, Alberto Vella, Giuseppe Costantino Giaconia	Fabrizio Traina
17:40	Hydraulic transients induced by Pressure Reduction Valves – simulation and validation	Alessandro Siviero, Riccardo Vesipa	Riccardo Vesipa

MS23 - Structural health monitoring for urban and extra-urban environments

AULA 10

CHAIRS: Michele Betti, Nicola Cavalagli, Francesco Clementi, Ernesto Grande

	Title	Author(s)	Speaker
17:00	A reference digital replica of an urban tree based on ambient vibration tests	Michele Betti, Nicola Cavalagli, Francesco Clementi, Ersilia Giordano, Ernesto Grande, Gianluca Standoli	Francesco Clementi
17:20	Reconstruction of concrete internal defects based on unsupervised domain adaptation algorithm for impact vibration signals	Gao Shang, Jun Chen	Jun Chen
17:40	EMI instrumented wearable piezoelectric ring for bolted connection monitoring	Jianchao Wu, Weijie Li	Jianchao Wu

20:20

Social Dinner

Teatro Massimo

For those who would like to take a short tour of the Theatre, please come at **19:40**

Wednesday - August 30, 2023

SESSION 12

Aula Magna Business School Building 13

	Title	Speaker
09:15 - 09:55	Plenary Lecture: A universe of models and data - multilevel methods, multifidelity methods and beyond	Carsten Proppe

10:00 - 11:00 SESSION 13

BUILDING 19

MS01 - 20(20)23 Stochastic Mechanics & Meccanica Stocastica 20(20)23

International Conference (23SM&MS23)

AULA 5

in honor of Emeritus Professor Mario Di Paola

CHAIRS: Vittorio Gusella, Giuseppe Marano, Giuseppe Muscolino, Antonina Pirrotta

	Title	Author(s)	Speaker
10:00	Post-earthquake rapid seismic demand estimation at unmonitored locations via Bayesian networks	Pooria Mesbahi, Enrique García-Macías, Marco Breccolotti, Filippo Ubertini	Pooria Mesbahi
10:20	Stochastic Response Analysis of Multi-Dimensional Nonlinear Systems via GE-GDEE with Enhanced Tail Accuracy	Yi Luo, Chao Dang, Matteo Broggi, Michael Beer	Yi Luo
10:40	An effective procedure for the full probabilistic characterization of the structural response of large DOF systems subjected to seismic actions	Giacomo Navarra, Francesco Lo Iacono, Maria Oliva	Giacomo Navarra

MS14 - Multi Risk by natural actions: mitigation strategies for structures and infrastructures

AULA 10

CHAIR: Liborio Cavaleri

	Title	Author(s)	Speaker
10:00	The Durability and Self-Healing performance of Ultra-High Performance Concrete in Aggressive Chloride-rich Environments.	Ruben Paul Borg	Ruben Paul Borg
10:20	Refined numerical analysis of the seismic response of masonry building aggregates	Sofia Villar, Fabio Di Trapani, Marilisa Di Benedetto, Massimo Petracca, Guido Camata	Sofia Villar
10:40	Refined assessment of the internal forces of infilled frames due to frame-infill interaction under seismic loads	Marilisa Di Benedetto, Fabio Di Trapani, Massimo Petracca, Guido Camata	Marilisa Di Benedetto

MS19 - Experimental Characterization, Identification, Analysis, and Design of Mechanical Systems with Hysteretic Behavior

AULA Seminari B

CHAIRS: Salvatore Sessa, Nicolò Vaiana, Biagio Carboni

	Title	Author(s)	Speaker
10:00	Simulation of the hysteretic behavior of timber connections by the Vaiana-Rosati model: parameters identification based on energy dissipation	Agnese Spedicato, Nicolò Vaiana, Stefania Lo Feudo, Jean-Luc Dion, Luciano Rosati	Agnese Spedicato
10:20	Parametric identification of frictional joints in structures	Jean-Luc Dion, Antonio Baldassarre, Stefania Lo Feudo, Franck Renaud	Jean-Luc Dion
10:40	Optimization strategy for the calibration of a generalized hysteretic model	Salvatore Sessa, Nicolò Vaiana	Salvatore Sessa

MS24 - Recent advances, applications and challenges of coupled free flow and porous media flow systems

AULA 3

CHAIRS: Martin Schneider, Holger Class, Rainer Helmig, Costanza Aricò, Donatella Termini

	Title	Author(s)	Speaker
10:00	A new numerical one-domain approach solver for the interaction of free fluid and porous medium at the mesoscale	Costanza Aricò, Martin Schneider, Daniele Puleo, Rainer Helmig	Costanza Aricò
10:20	Numerical investigation of the flat plate solar collector (FPSC) at the mesoscale and and macroscale. Preliminary results	Memoona, Daniele Puleo, Antonina Pirrotta, Costanza Aricò	Memoona

MS28 - Vibration-based Monitoring of Dynamic Systems

AULA 8

CHAIRS: Manolis Chatzis, Eleni Chatzi, Vasileios Ntertimanis, Geert Lombaert

	Title	Author(s)	Speaker
10:00	Intelligent Automatic Operational Modal Analysis	Marco Martino Rosso, Angelo Aloisio, Giuseppe Carlo Marano, Giuseppe Quaranta	Marco Martino Rosso
10:20	Influence of noise on First Passage Time maps and their use for early damage detection	Kevin Theunissen, Vincent Denoël	Kevin Theunissen
10:40	Characterization of the dynamic response of a curved nine-spans post-tensioned concrete box girder highway bridge with half-joints	Elisa Tomassini, Enrique García-Macías, Francesco Mariani, Ilaria Venanzi, Filippo Ubertini	Elisa Tomassini

MS29 - Bio-fluid mechanics

AULA 4

CHAIRS: Valerio Caleffi, Giorgio Querzoli, Jan O. Pralits, Rodolfo Repetto, Annunziato Siviglia, Francesca Maria Susin

	Title	Author(s)	Speaker
10:00	A mechanical model of exudative macular oedema	Alessia Ruffini, Maria Dvoriashyna, Rodolfo Repetto	Alessia Ruffini
10:20	Hemodynamics in patients supported on VA-ECMO: a preliminary OD model.	Caterina Cara, Paolo Peruzzo, Laura Besola, Nicola Nencioni, Andrea Colli, Francesca Maria Susin	Caterina Cara
10:40	Anchoring and Migration of Balloon in REBOA	Chiang Mei, Yile Li, Simone Michele, Paolo Sammarco, Paul McBeth	Paolo Sammarco

MS30 - Structural Monitoring and Identification of Complex Dynamical Systems

AULA Seminari A

CHAIRS: Alberto Di Matteo, Kalil Erazo

	Title	Author(s)	Speaker
10:00	Parameter estimation of stochastic fractional dynamic systems using recursive nonlinear filtering system identification methods	Alberto Di Matteo, Kalil Erazo, Pol D. Spanos	Alberto Di Matteo
10:20	Novel bridge damping identification procedure through vehicle-bridge interaction	Matteo Mazzeo, Roberta Santoro, Alberto Di Matteo	Roberta Santoro
10:40	Fisher Information based Optimal Sensor Locations for Structural Identification: Non-Stationary Inputs and Non-Classically Damped Systems	Dhiraj Ghosh, Suparno Mukhopadhyay	Dhiraj Ghosh

MS41 - Emerging Mathematical Tools in Advanced Modelling: The Fractional-Order Calculus, in honor of Emeritus Professor Teodor Atanackovic

AULA 6

CHAIR: Massimiliano Zingales

	Title	Author(s)	Speaker
10:00	Asymptotic Homogenization for determining the effective mechanical response of a composite material exhibiting fractional viscoelastic behavior at the microstructural scale	Alfio Grillo, Raimondo Penta, Ariel Ramírez-Torres	Alfio Grillo
10:20	On the wave propagation in fractional nonlocal elastic rods, beams and plates	Noël Challamel, Teodor Atanackovic, YP Zhang, CM Wang	Noël Challamel

11:00 - 11:40 Coffee break

**MS01 - 20(20)23 Stochastic Mechanics & Meccanica Stocastica 20(20)23
International Conference (23SM&MS23)
in honor of Emeritus Professor Mario Di Paola**

AULA 5

CHAIRS: Vittorio Gusella, Giuseppe Marano, Giuseppe Muscolino, Antonina Pirrotta

	Title	Author(s)	Speaker
11:40	Random vibrations in Earthquake engineering: state of the art and future perspectives	Giuseppe Carlo Marano	Giuseppe Carlo Marano
12:00	Boundary value problems for fractional stochastic differential equations under white noise process	Andrea Burlon, Mario Di Paola, Giuseppe Failla, Pol D. Spanos	Andrea Burlon
12:20	Fractional differential equations forced by α-stable white noise	Gioacchino Alotta	Gioacchino Alotta

MS14 - Multi Risk by natural actions: mitigation strategies for structures and infrastructures

AULA 10

CHAIR: Liborio Cavaleri

	Title	Author(s)	Speaker
11:40	A performance-based hurricane engineering methodology to quantify the effects of climate change and structural aging for single-family wooden houses	Michele Barbato	Michele Barbato
12:00	Mechanical insights on energy dissipating devices behaviour	Francesco Pimpinella, Maddalena Marchelli, Valerio De Biagi	Francesco Pimpinella
12:20	The probabilistic response of masonry structures under Tsunami	Panagiotis G. Asteris, Liborio Cavaleri	Liborio Cavaleri

MS19 - Experimental Characterization, Identification, Analysis, and Design of Mechanical Systems with Hysteretic Behavior

AULA Seminari B

CHAIRS: Salvatore Sessa, Nicolò Vaiana, Biagio Carboni

	Title	Author(s)	Speaker
11:40	Hysteretic cycles via thermodynamic and variational approaches	Luca Placidi, Francesco D'Annibale	Luca Placidi
12:00	Modeling of hysteretic systems using physics-guided universal ordinary differential equations	Sebastián Delgado-Trujillo, Diego A. Álvarez, Daniel Bedoya-Ruiz, Michael Heredia-Pérez	Michael Heredia-Pérez

MS28 - Vibration-based Monitoring of Dynamic Systems

AULA 8

CHAIRS: Manolis Chatzis, Eleni Chatzi, Vasileios Ntertimanis, Geert Lombaert

	Title	Author(s)	Speaker
11:40	Real- time SHM of laboratory scale structures using Internet of Thing (IoT) enabled technology	Abhishek Dilip Aherwar, T. Jothi Saravanan, Mayank Mishra, Paulo B. Lourenço	Mayank Mishra
12:00	Multi-class and Unknown Damage Detection under Varying Environmental Conditions via Open Set Domain Adaptation	Mingyuan Zhou, Zhilu Lai	Mingyuan Zhou
12:20	Identification of strain influence lines of railway bridges from the structural response at train passage	Said Quqa, Antonio Palermo, Alessandro Marzani	Antonio Palermo

MS38 - Advances in experimental characterization and numerical modelling of masonry structures retrofitted with traditional and innovative techniques

AULA 9

CHAIRS: Giovanni Minafò, Gabriele Milani, Maria Concetta Oddo, Piero Colajanni, Giuseppe Ruta, Fabio Di Trapani

	Title	Author(s)	Speaker
11:40	Debonding sawtooth analytical model for SRG-strengthened joints subjected to direct shear and experimentally tested	Natalia Pingaro, Angelo Savio Calabrese, Gabriele Milani, Carlo Poggi	Angelo Savio Calabrese
12:00	A Genetic Algorithm approach for the calibration of a numerical model for the simulation of the FRCM-to-masonry bond	Giovanni Minafò, Gaetano Camarda, Marielisa Di Leto, Lidia La Mendola	Marielisa Di Leto
12:20	Advanced numerical modelling of masonry arches reinforced with SRG	Natalia Pingaro, Gabriele Milani	Angelo Savio Calabrese

MS17 - Recent Advances and Challenges in Modelling Masonry Structures

AULA 7

CHAIRS: Daniela Addressi, Francesco Messali, Jan G. Rots, Elio Sacco

	Title	Author(s)	Speaker
11:40	A simple micro-mechanically based constitutive model for the analysis of masonry structures	Gregorio Bertani, Luca Patruno, Antonio Maria D'Altri, Giovanni Castellazzi, Stefano de Miranda	Gregorio Bertani
12:00	A three-dimensional interface for the nonlinear axial-flexural behavior of masonry macroelements subjected to biaxial bending	Christian Salvatori, Gabriele Guerrini, Andrea Penna	Christian Salvatori
12:20	Finite Element Micro-Modelling of Masonry Structures: Calibration and Analysis Challenges	Amirhossein Ghezelbash, Francesco Messali, Jan G. Rots	Amirhossein Ghezelbash

12:40 - 14:20 Lunch

MS01 - 20(20)23 Stochastic Mechanics & Meccanica Stocastica 20(20)23**International Conference (23SM&MS23)****AULA 5****in honor of Emeritus Professor Mario Di Paola****CHAIRS: Vittorio Gusella, Giuseppe Marano, Giuseppe Muscolino, Antonina Pirrotta**

	Title	Author(s)	Speaker
14:20	Stochastic response determination of nonlinear systems with fractional derivative elements via path integral approach using Laplace's method	Alberto Di Matteo, Antonina Pirrotta	Alberto Di Matteo
14:40	A possible description of random variables in quantum computing	Salvatore Sessa	Salvatore Sessa
15:00	Diffusive term of the Fractional Fokker Planck equation handled by self-similarity theory	Salvatore Russotto, Mario Di Paola, Antonina Pirrotta	Salvatore Russotto
15:20	Reliability bounds for structures controlled by external fractional viscoelastic dampers	Alba Sofi, Giuseppe Muscolino, Mario Di Paola	Alba Sofi
15:40	A proposal for the probabilistic distribution of highly-non-Gaussian peak factors for the wind pressure acting on hyperbolic paraboloid roofs	Michele Barbato	Michele Barbato

MS12 - Mechanical modeling and experimentation of inorganic matrix fiber and textile reinforced composite systems**AULA Seminari B****CHAIRS: Andrea Nobili, Tommaso D'Antino, Cesare Signorini**

	Title	Author(s)	Speaker
14:20	Experimental analysis of hemp-matrix biocomposite material for masonry structural strengthening	Roberta Scungio, Chiara Pepi, Pier Francesco Greco, Michele Arturo Caponero, Massimiliano Gioffrè	Chiara Pepi
14:40	Probabilistic models for hemp fibers and yarns mechanical properties to use as bio composite reinforcing material	Massimiliano Gioffrè, Maria Eleonora Pipistrelli, Chiara Pepi	Maria Eleonora Pipistrelli
15:00	Analytical modelling of the bond behavior of carbon FRCM-masonry joints exposed to high temperature	Veronica Bertolli, Cesare Signorini, Andrea Nobili, Tommaso D'Antino	Tommaso D'Antino
15:20	Influence of glass-fibre epoxy coating on bond and tensile behaviour of FRCM systems: an experimental and analytical investigation	Rebecca Grazzini, Giulia Misseri, Luisa Rovero	Luisa Rovero

MS14 - Multi Risk by natural actions: mitigation strategies for structures and infrastructures

AULA 10

CHAIR: Liborio Cavaleri

	Title	Author(s)	Speaker
14:20	Rock blocks impacts on masonry walls: modelling for vulnerability evaluation	Maddalena Marchelli, Valerio De Biagi	Maddalena Marchelli
14:40	Environmental Durability of Externally Bonded FRP-Repaired Concrete	Ruben Paul Borg, Fabio Spiteri	Ruben Paul Borg
15:00	A strategy to improve the effectiveness of friction dampers for seismic protection	Liborio Cavaleri	Liborio Cavaleri
15:20	Joint Effects of Thermal Stresses and Corrosion on Integral Abutment Bridges	Alessandro Contento, Angelo Aloisio, Junqing Xue, Giuseppe Quaranta, Bruno Briseghella, Paolo Gardoni	Alessandro Contento
15:40	Enhancing Resilience of Circular RC Bridge Piers with CFRP Seismic Retrofitting: Performance Under Vehicular Lateral Impact Loading	Cristoforo Demartino, Sicheng Zhou	Cristoforo Demartino
16:00	A tropical cyclone intensity model using the conditional generative adversarial network	Tianle Chen, Xu Hong, Liang Hu, Fan Kong	Fan Kong

MS17 - Recent Advances and Challenges in Modelling Masonry Structures

AULA 7

CHAIRS: Daniela Addressi, Francesco Messali, Jan G. Rots, Elio Sacco

	Title	Author(s)	Speaker
14:20	Masonry differential settlements analysis including the soil	Vincenzo Mallardo, Antonino Iannuzzo	Vincenzo Mallardo
14:40	An iterative linear programming procedure for non-associative kinematic limit analysis of masonry blocks	Mariaceleste Lasorella, Aguinaldo Fraddosio, Elio Sacco, Mario Daniele Piccioni	Mariaceleste Lasorella
15:00	Limit analysis of non-periodic masonry by means of Discontinuity Layout Optimization	Mattia Schiantella, Federico Cluni	Mattia Schiantella
15:20	Macro-mechanical models for the assessment of tunnelling induced damage on masonry structures	Marialuigia Sangirardi, Cristina Gatta, Daniela Addressi, Angelo Amorosi	Daniela Addressi
15:40	Novel numerical approaches for the modelling of axial-symmetric masonry domes	Francesca Roscini, Francesca Nerilli	Francesca Roscini
16:00	Modelling of Masonry with Microporomechanics	Pedro Henrique Rios Silveira, Rita Esposito	Pedro Henrique Rios Silveira

MS27 - Rocking mechanics in civil engineering			<i>AULA 4</i>
<i>CHAIRS: Michela Monaco, Antonino Iannuzzo</i>			
	Title	Author(s)	Speaker
14:20	Revisiting the rocking overturning spectrum of free-standing blocks via shaking table tests	Carla Colombo, Georgios Vlachakis, Nuno Mendes, Anastasios I. Giouvanidis, Nathanaël Savalle, Paulo B. Lourenço	Carla Colombo
14:40	Rocking analysis of masonry bell towers	Luciana Di Gennaro, Mariateresa Guadagnuolo, Michela Monaco	Luciana Di Gennaro
15:00	An experimental study on the effects of friction variability	Michelina Monaco, Ester Sallicandro, Roberto Serpieri	Michelina Monaco
15:20	A modified Drucker Prager numerical approach for the analysis of the San Francesco di Paola dome in Naples	Claudia Cennamo, Concetta Cusano, Arsenio Cutolo, Federico Guarracino, Ida Mascolo	Claudia Cennamo
MS38 - Advances in experimental characterization and numerical modelling of masonry structures retrofitted with traditional and innovative techniques			<i>AULA 9</i>
<i>CHAIRS: Giovanni Minafò, Gabriele Milani, Maria Concetta Oddo, Piero Colajanni, Giuseppe Ruta, Fabio Di Trapani</i>			
	Title	Author(s)	Speaker
14:20	The intrados strengthening of masonry arches with FRCM. The three-centred arch	Luciana Di Gennaro	Luciana Di Gennaro
14:40	An adaptive Scan-to-BIM workflow for the Dynamic Simulation of Architectural Heritage	Manuela Aricò, Calogero Cucchiara, Alessandra Ferro, Mauro Lo Brutto, Antonino Maltese, Calogero Vinci	Manuela Aricò
15:00	From 'in falso' to masonry wall beam	Riccardo Liberotti, Federico Cluni, Francesco Faralli, Vittorio Gusella	Riccardo Liberotti
15:20	A Genetic Algorithm approach for the prediction of loading scenarios in masonry walls equipped with stress sensors	Gaetano Camarda, Giovanni Minafò, Maria Cetta Oddo, Marielisa Di Leto, Lidia La Mendola	Marielisa Di Leto
15:40	Crack width prediction and investigation for flexural reinforced concrete members	Zhi Zhang, Fangyin Zhang, Liling Cao, Alaukik Singh	Zhi Zhang
16:00	Effects of post-tension on the structural capacity of masonry bridges	Laura Niero, Riccardo Piazzon, Paolo Zampieri, Carlo Pellegrino	Laura Niero
16:20	Seismic Performance Enhancement of Unreinforced Brick Masonry Buildings by Retrofitting with Reinforced Concrete Bands: Full Scale Experiments	Lakshmi Latha, Samit Ray-Chaudhuri, Suparno Mukhopadhyay, Kunwar K. Bajpai	Suparno Mukhopadhyay

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Title: A CFD-based analysis on the effects of bundle porosity in regularly packed hollow fiber membrane contactors

Author(s): Nunzio Cancilla^{*1}, Luigi Gurreri², Michele Ciofalo¹, Andrea Cipollina¹, Alessandro Tamburini¹, Giorgio Micale¹

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Keyword(s): Computational Fluid Dynamics, hollow fiber membrane contactor, Darcy permeability, mass transfer coefficient

Abstract

Hollow Fiber Membrane (HFM) contactors are very common today in many applications of membrane separation processes, e.g. in the biomedical field, in gas separation treatments, in water treatment and desalination processes but also in gas-liquid or liquid-liquid extraction [1]. HFM contactors are cylindrically shaped devices with two separate compartments (lumen and shell), which guarantee the fluids segregation. While the analysis of the lumen side flow is fairly simple and it is usually modelled by the Hagen Poiseuille law and by semi-empirical correlations providing information on the mass transport, the analysis on the shell side is very complex since it depends on many parameters and involves complex flow fields formation.

This work aims to investigate by means of CFD the influence of the porosity ε on fluid flow around bundles of straight fibers, arranged in regular square and hexagonal lattices. In the range of low Reynolds number (Re) studied, the fluid flows across the bundle following the Darcy's law. Purely axial ($Re_z=10$, $Re_t=0$), purely transverse ($Re_z=0$, $10^{-3}<Re_t<30$) and mixed ($Re_z=100$, $10^{-3}<Re_t<30$) flows are investigated in steady laminar and fully developed conditions [2]. Simulations use the unit cell approach [3], in which the periodic computational domain includes a single fiber with the associated fluid.

Both in purely axial and in purely transverse flow, the axial and the transverse permeabilities K_z and K_t increase strongly with ε , especially for $\varepsilon>0.8$. In mixed flow, K_z is not affected by Re_z (as expected for a Darcy medium), but for $Re_t>1$ K_z decreases significantly with Re_t . For both lattices, K_t is not affected by Re_z . For $Re_t<10$, K_t is not affected either by Re_t (Darcian medium) or by the angle θ between the applied pressure gradient and the x axis (isotropic medium).

In purely axial flow, the mass transfer coefficient vs ε curve exhibits a bell-shaped behaviour. In purely transverse flow, Sherwood number (Sh) strongly depends on θ even at $Re_t<0.01$, denoting a strong anisotropy. For both lattices, the mass transfer coefficient exhibits minima at θ corresponding to directions of symmetry, while it is much larger at intermediate angles. In mixed flow, the axial flow causes Sh to increase in a complex dependence on geometry (square vs hexagonal), ε and Re_t .

References

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