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| 03-10-2019 | Final Report | 1-Jan-2018 - 30-Sep-2018 |

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Final Report: Conference Support for ESMC 2018 Mini-symposium on the Physics of dense granular media

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W911NF-18-1-0054

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**5d. PROJECT NUMBER**

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Yale University
Office of Sponsored Projects
25 Science Park - 3rd Floor
New Haven, CT 06520 -8327

**8. PERFORMING ORGANIZATION REPORT NUMBER**

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**14. ABSTRACT**

**15. SUBJECT TERMS**

| 16. SECURITY CLASSIFICATION OF: | | | 17. LIMITATION OF ABSTRACT | 15. NUMBER OF PAGES | 19a. NAME OF RESPONSIBLE PERSON |
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| a. REPORT | b. ABSTRACT | c. THIS PAGE | | | Corey O'Hern |
| UU | UU | UU | UU | | 19b. TELEPHONE NUMBER +12-034-3242 |

# RPPR Final Report
as of 13-Jan-2020

Agency Code:

Proposal Number: 72597EVCF **Agreement Number: W911NF-18-1-0054**
**INVESTIGATOR(S):**

**Name:** Corey O'Hern
**Email:** corey.ohern@yale.edu
**Phone Number:** +12034324258
**Principal:** Y

Organization: **Yale University**
Address: Office of Sponsored Projects, New Haven, CT 065208327
Country: USA
DUNS Number: 043207562 EIN: 060646973
**Report Date:** 31-Dec-2018 Date Received: 03-Oct-2019
**Final Report** for Period Beginning 01-Jan-2018 and Ending 30-Sep-2018
**Title:** Conference Support for ESMC 2018 Mini-symposium on the Physics of dense granular media
**Begin Performance Period:** 01-Jan-2018 **End Performance Period:** 30-Sep-2018
**Report Term:** 0-Other
Submitted By: Corey O'Hern Email: corey.ohern@yale.edu
Phone: (+12) 034-324258


**STEM Degrees:** 2 **STEM Participants:** 4

**Major Goals:** This award supported the travel costs and registration for 9 invited participants from the US to give talks in a mini-symposium entitled “Physics of dense granular media” as a part of the 10th European Solid Mechanics Conference (ESMC) July 2-6, 2018 in Bologna, Italy. The ESMC series, which occurs every three years, is the premier conference for researchers in the vibrant solid mechanics and granular materials communities in Europe. ESMC 2018 featured 54 mini-symposia spanning continuum mechanics, particulate media, metamaterials, and composites. The “Physics of dense granular media” mini-symposium was co-organized by the PI, Prof. Robert Behringer, and Prof. Lou Kondic, who are leaders in the fields of experimental and computational studies of granular media and have a strong history of collaboration and co-organizing conferences, workshops, and symposia. The mini-symposium featured experimental, theoretical, and computational work from researchers in the US and European granular materials communities focused on the structural and mechanical properties of static granular packings, as well as the dynamics of slowly driven granular systems. Key topics included static packings of non-spherical and entangled grains, preparation protocol dependence of the jamming transition, characterization of force chain networks, continuum descriptions of dense granular flows, shear thickening, fluid-driven granular beds, sediment transport, and geophysical flows. Many of these topics are directly related to the main goal of ARO’s Program on Earth Materials and Processes, which seeks to understand the dynamic and mechanical properties of near-surface Earth materials.

**Accomplishments:** The 10th European Solid Mechanics Conference was held in Bologna, Germany July 2-6, 2018. The conference was held at the Palazzo della Cultura e dei Congressi. 1100 abstracts were presented during 55 mini-symposia devoted to topics in mechanics and materials science.

The award supported the mini-symposium, "The physics of dense granular media", which included 5 two-hour sessions, each with six 20-minute talks. The sessions were held Wednesday, July 4 10:15 AM - 12:15 PM; Thursday, July 5, 10:15AM - 12:15PM; Thursday, July 5, 2:30PM - 4:30PM; Thursday, July 5, 5:00PM - 7:00PM; and Friday, July 6, 10:15AM - 12:15PM.

The ESMC also allowed numerous opportunities for discussion and collaboration including a welcome reception on July 2 from 7:15PM to 9:00PM, a gala dinner on July 5 from 8:00PM to 11:00PM at the Palazzo Re Enzo. In addition, lunch and poster sessions were held each day from 12:15PM to 1:45PM and coffee breaks were held each day from

4:30PM to 5:00PM.

The speakers in "The physics of dense granular media" mini-symposium included:

Robert Behringer, Duke University
Michio Otsuki, Osaka University
Narayanan Menon, University of Massachusetts, Amherst
Mark Shattuck, City College of New York
Arman Boromand, Yale University
Sinisa Mesarovic, Wahsington State University
Craig Maloney, Northeastern University
Karin Dahmen, University of Illinois, Urbana-Champaign
Ken Kamrin, MIT
K. P. Krishnaraj, Indian Institute of Science, Bangalore
Kianoosh Taghizadeh, University of Twente
Lenka Kovalcinova, NJIT
Corey O'Hern, Yale University
Bulbul Chakraborty, Brandeis University
Brian Tighe, TU Delft
Nicholas Ouellette, Stanford University
Marie-Julie Dalbe, MIT
Lou Kondic, NJIT
Abram Clark, Yale University
Alexandre Nicolas, Baboratoire de Physique Theorique et Modeles Statisques
Segolene Mejean, University of Sydney
Ko Okumura, Ochanomizu University
Tomas Trewhela, EPFL
Tejas Murthy, Indian Institute of Science, Bangalore
Justin Burton, Emory University
Riccardo Artoni, Institut Francais des Sciences et Technologies des Transports
Georgios Theocharis, Laboratoire d'Acoustique de Universite du Maine
Yiqiu Zhao, Duke University

The following served as moderators during the five sessions:

Ken Kamrin, MIT
Lou Kondic, NJIT
Mark Shattuck, City College of New York
Brian Tighe, TU Delft
Craig Maloney, Northeastern University
Robert Behringer, Duke University
Karin Dahmen, University of Illinois, Urbana-Champaign
Corey O'Hern, Yale University
Bulbul Chakraborty, Brandeis University
Narayanan Menon, University of Massachusetts, Amherst

# RPPR Final Report
as of 13-Jan-2020

**Training Opportunities:** Each of the organizers of the mini-symposium "The physics of dense granular media", Corey O'Hern (Yale University), Robert Behringer (Duke University), and Lou Kondic (NJIT) brought junior scientists to participate and present at the mini-symposium. The junior scientists were the following, including their talk titles:

Arman Boromand, Yale University, "Dense packing of cell monolayers: Jamming of deformable polygons"
Abram Clark, Yale University, "Critical scaling of granular materials near the yielding transition"
Yiqiu Zhao, Duke University, "Lower limits of shear jamming"
Lenka Kovalcinova, NJIT, "Comparison of the force network topology of 2D and 3D granular systems"

The junior scientists were able to present and discuss their work to numerous experts in the field of granular materials and listen to additional talks on a wide variety of topics in mechanics and materials science. Within a year after the meeting, Arman Boromand to a staff scientist position at Corning and Abram Clark joined the faculty at the Naval Postgraduate School.

**Results Dissemination:** As mentioned previously, the mini-symposium, "The physics of dense granular media" included 5 two-hour sessions, each with six 20-minute talks. Talks from the O'Hern research group included:

1) Arman Boromand, Yale University, "Dense packing of cell monolayers: Jamming of deformable polygons"
2) Abram Clark, Yale University, "Critical scaling of granular materials near the yielding transition"
3) Mark Shattuck, City College of New York, "Jamming of non-circular and deformable particles"
4) Corey O'Hern, Yale University, "Stress anisotropy in quasi-statically sheared granular packings"

The talks discussed research that was published as:

1) A. Boromand, A. Signoriello, J. Lowensohn, C. S. Orellana, E. R. Weeks, F. Ye, M. D. Shattuck, and C. S. O'Hern, ``The role of deformability in determining the structural and mechanical properties of bubbles and emulsions," Soft Matter 15 (2019) 5854.
2) A. Boromand, A. Signoriello, F. Ye, C. S. O'Hern, and M. D. Shattuck, ``Jamming of deformable polygons," Phys. Rev. Lett. 121 (2018) 248003.
3) S. Chen, T. Bertrand, W. Jin, M. D. Shattuck, and C. S. O'Hern, ``Stress anisotropy in shear-jammed packings of frictionless disks," Phy. Rev. E 98 (2018) 042906.
4) A. H. Clark, M. D. Shattuck, N. T. Ouellette, and C. S. O'Hern, ``Critical scaling near the yielding transition in granular media," Phys. Rev. E 97 (2018) 062901.
5) K. VanderWerf, W. Jin, M. D. Shattuck, and C. S. O'Hern, ``Hypostatic jammed packings of frictionless nonspherical particles," Phys. Rev. E 97 (2018) 012909.

# RPPR Final Report
as of 13-Jan-2020

**Honors and Awards:** Title: A GPU computing platform for modeling fluid-sheared granular beds
Role: PI
Annual Direct Costs: $240,028
Source: Army Research Office (DURIP)
Period of Award: 06/15/18-06/14/19

2018 Yale School of Engineering & Applied Science Ackerman Teaching and Mentoring Award

**Protocol Activity Status:**

**Technology Transfer:** Nothing to Report

**PARTICIPANTS:**

**Participant Type:** PD/PI
**Participant:** Corey OHern
**Person Months Worked:** 1.00 **Funding Support:**
Project Contribution:
International Collaboration:
International Travel:
National Academy Member: N
Other Collaborators:

**ARTICLES:**

**Publication Type:** Journal Article Peer Reviewed: Y **Publication Status:** 1-Published
**Journal:** Soft Matter
Publication Identifier Type: DOI Publication Identifier: 10.1039/C9SM00775J
Volume: 15 Issue: 29 First Page #: 5854
Date Submitted: 10/3/19 12:00AM Date Published:
Publication Location:
**Article Title:** The role of deformability in determining the structural and mechanical properties of bubbles and emulsions
**Authors:** Arman Boromand, Alexandra Signoriello, Janna Lowensohn, Carlos S. Orellana, Eric R. Weeks, Fangfu
**Keywords:** bubbles, emulsions, jamming
**Abstract:** We perform computational studies of jammed particle packings in two dimensions undergoing isotropic compression using the well-characterized soft particle (SP) model and deformable particle (DP) model that we developed for bubbles and emulsions. In the SP model, circular particles are allowed to overlap, generating purely repulsive forces. In the DP model, particles minimize their perimeter, while deforming at fixed area to avoid overlap during compression. We compare the structural and mechanical properties of jammed packings generated using the SP and DP models as a function of the packing fraction ?, instead of the reduced number density ?. We show that near jamming onset the excess contact number ?z = z ? zJ and shear modulus G scale as ??0.5 in the large system limit for both models, where ?? = ? ? ?J and zJ ? 4 and ?J ? 0.842 are the values at jamming onset. ?z and G for the SP and DP models begin to differ for ? ? 0.88. In this regime, ?z ? G can be described by a sum of two pow
**Distribution Statement:** 1-Approved for public release; distribution is unlimited.
Acknowledged Federal Support: **Y**

# RPPR Final Report
as of 13-Jan-2020

**Publication Type:** Journal Article Peer Reviewed: Y **Publication Status:** 1-Published
**Journal:** Physical Review E
Publication Identifier Type: DOI Publication Identifier: 10.1103/PhysRevE.97.062901
Volume: 97 Issue: 6 First Page #:
Date Submitted: 10/3/19 12:00AM Date Published: 6/1/18 4:00AM
Publication Location:
**Article Title:** Critical scaling near the yielding transition in granular media
**Authors:** Abram H. Clark, Jacob D. Thompson, Mark D. Shattuck, Nicholas T. Ouellette, Corey S. O'Hern
**Keywords:** yielding transition, sediment transport
**Abstract:** We show that the yielding transition in granular media displays second-order critical-point scaling behavior. We carry out discrete element simulations in the low inertial number limit for frictionless, purely repulsive spherical grains undergoing simple shear at fixed nondimensional shear stress $\Sigma$ in two and three spatial dimensions. To find a mechanically stable (MS) packing that can support the applied $\Sigma$, isotropically prepared states with size $L$ must undergo a total strain $\gamma_{\rm ms}(\Sigma,L)$. The number density of MS packings ($\propto \gamma_{\rm ms}^{-1}$) vanishes for $\Sigma > \Sigma_c \approx 0.11$ according to a critical scaling form with a length scale $\xi \propto |\Sigma - \Sigma_c|^{-\nu}$, where $\nu \approx 1.7-1.8$. Above the yield stress ($\Sigma>\Sigma_c$), no MS packings that can support $\Sigma$ exist in the large system limit, $L/\xi \gg 1$. MS packings generated via shear possess anisotropic force and contact networks, suggesting that $\S

Acknowledged Federal Support: **Y**

ESMC 2018 BOLOGNA

UNIVERSITÀ DI TRENTO

ALMA MATER STUDIORUM
UNIVERSITÀ DI BOLOGNA

# ESMC 2018

## 10th European Solid Mechanics Conference

EUROPEAN MECHANICS SOCIETY

**BOLOGNA** July 2-6, 2018 | Palazzo dei Congressi

PROGRAM BOOK

## WELCOME TO ESMC 2018

Dear Colleagues,

It is our pleasure to welcome you to Bologna for the 10th European Solid Mechanics Conference. The conference, organized by the Universities of Bologna and Trento, under the auspices of EuroMech, will be held at the "*Palazzo della Cultura e dei Congressi*" in Bologna, during July 2-6, 2018.

The European Solid Mechanics Conference is organized every three years and constitutes the major event for the solids mechanics community in Europe, providing a unique forum for scientists and engineers to exchange ideas on the current state-of-the-art in the mechanics of solids, on new concepts and ideas and to identify new research directions.

Previous European Solid Mechanics Conferences were held in Munich, Genova, Stockholm, Metz, Thessaloniki, Budapest, Lisbon, Graz, and Madrid. This 10th edition in Bologna will feature 6 plenary lectures given by Prof. Bernhard Schrefler (General Lecturer), Prof. Katia Bertoldi, Prof. Odd Sture Hopperstad, Prof. Ray W. Ogden, Prof. Thomas Pardoen, Prof. Zhigang Suo, together with the lecture of the recipient of the Solid Mechanics Prize, Prof. Erik van der Giessen. In addition, the status of Euromech fellow will officially be conferred to three distinguished scientists on July 4th.

More than 1300 abstracts were received and approximately 1100 were accepted after the review process to ensure the quality of the contributions. They will be presented in 20 parallel sessions, which encompass general sessions and 55 mini-symposia devoted to the most important topics in the areas of biomechanics, composite materials and homogenization theory, computational mechanics, continuum mechanics, dynamics, waves and metamaterials, experimental mechanics, mechanics of materials, multifield and multiscale problems, and structural mechanics.

Looking forward to a fruitful European Solid Mechanics Conference, receive our best regards,

*Davide Bigoni and Francesco Ubertini*
*ESMC2018 Chairmen*

## Scientific Committee

### Chairman

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|---|---|
| Prof. A. Corigliano | Politecnico di Milano |

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| Prof. C.F. Niordson | Technical University of Denmark |
| Prof. F. Ubertini | University of Bologna |

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| Prof. M. Savoia | University of Bologna |
| Dr. R. Springhetti | University of Trento |

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EUROPEAN MECHANICS SOCIETY

With the patronage of:

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ESMC2018 è Bologna

With the contribution of:

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DIPARTIMENTO DI INGEGNERIA CIVILE, CHIMICA, AMBIENTALE E DEI MATERIALI

We wish to thank the following for their contributions to the success of this conference:

COMSOL

erc INSTABILITIES

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NANOVEA

SACMI

Springer

THE ROYAL SOCIETY PUBLISHING

PIQUADRO

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FONDAZIONE ALMA MATER

# USEFUL INFORMATION

# ESMC 2018

All the sessions will take place at the "Palazzo della Cultura e dei Congressi" in Bologna, Italy. The address of the conference venue is "Piazza della Costituzione, 4, 40128 Bologna".

## REGISTRATION/HELP DESK

Conference reception desk will be located in the hall at the entrance on the ground floor. The ESMC 2018 staff will be available to register participants at the following times:

| Sunday, July 1st | Monday, 2nd – Friday, 6th |
|---|---|
| 14:00 - 21:00hr | 8:00 – 19:00hr |

At registration, you will receive your conference pack, including the conference program, your conference badge, the invoice for the participation fee and your certificate of attendance.
During the conference and the social events, including the Gala Dinner, your conference badge must be worn all the times. Important: the entrance to the conference without wearing your badge will not be allowed.
Staff will be available in every room and at the registration desk located in the hall at the entrance on the ground floor to answer any participant queries/enquiries.

## PRESENTATION INSTRUCTIONS

The rooms are equipped with a PC and a computer projector. Presenters must provide to the staff in the room the file for the presentation in PDF (acrobat) of PPT (Powerpoint) format on a USB memory stick. This must be done 15 minutes before each session. Chairs are requested to keep the sessions on schedule. Papers should be presented in the order they are listed in the program for the convenience of attendees who may wish to go to other rooms to listen to particular papers. In the case of a presenter not attending, please use the extra time for a discussion so the remaining papers stay on schedule. The PC in the lecturer rooms should be used for presentations. IT technicians will be available during the conference to be contacted in case of problems.
General lectures will be held in *"Europa Auditorium"* on the first floor. Parallel sessions will be held in several rooms located on all floors.

## TECHNICAL SESSIONS

All participants are expected both to attend the entire conference and to contribute actively to the discussions. The conference will take place in an informal atmosphere. The details of the Technical Sessions can be found in the pages: 18-19, 78-79, 142-143, 166-167, 226-227

## SOCIAL EVENTS

### Welcome Reception

The welcome reception is included in the registration fee and will take place on 2nd of July, at 19:15 in the Lunch Area on the 1st floor.

### Gala Dinner

The gala dinner is included in the registration.
The gala dinner will take place in the old town, at "Palazzo Re Enzo" – Piazza del Nettuno, 1/C.
The gala dinner will begin at 20:00, July 5th. Staff will be checking dinner bookings on arrival at the dinner venue. **Please wear your badges.**
Special dietary requirements, vegetarian and vegan meals should have been ordered on your booking form. If you have requested so, please inform your assigned waiter.

## SOCIAL PROGRAM

ESMC2018 participants can book special touristic tours of Bologna organized by *Bologna Welcome*:

- **DISCOVER BOLOGNA** Stroll back through the city's history, admiring the historical monuments and medieval towers that watch over Bologna to this day. UNESCO has defined the historical centre of Bologna as the best preserved medieval centre in the world;
- **LE DUE TORRI – TORRE DEGLI ASINELLI** What's the most exciting thing in Bologna? Find out for yourself by climbing the 498 steps of one of Bologna's remarkable symbols;
- **FICO & THE CITY** Immerse yourself in the beauty of Bologna and Italian cuisine at FICO Eataly World, the world's first food-themed amusement park;
- **TOWERS TOUR** Prestige and power, but also love, art, culture and technology - the medieval towers of Bologna keep watch from their perch above the rooftops, silently witnessing the passage of centuries. The city reached its maximum splendor in the shadow of these iconic remains of times past and symbol of Bologna all over the world;
- **BOLOGNA TASTE** Discover the wine and food traditions of Bologna in the medieval town market and drink in the atmosphere of one of the city's oldest and most important traditional markets;
- **DISCOVER THE FLAVOURS OF EMILIA** A tasty trip in Emilia Romagna to discover the unique flavours of the region: balsamic vinegar, Modena prosciutto ham, Parmigiano Reggiano and wine from the Bologna hills;
- **DUCATI&LAMBORGHINI: MUSEUMS AND FACTORIES** Experience the Motor Valley; discover the prestigious motoring companies - Ducati and Lamborghini. Come with us and see how passion becomes art, technology and quality;
- **FOOD AND FERRARI TOUR** This once-in-a-lifetime experience will take you to the Italian Food Valley - where the most famous and delicious Italian foods are made - and to the Motor Valley, where the Ferrari legend was born.

For more detailed information: https://www.bolognawelcome.com/en/tour-esmc-2018.

**MEALS AND REFRESHMENTS**

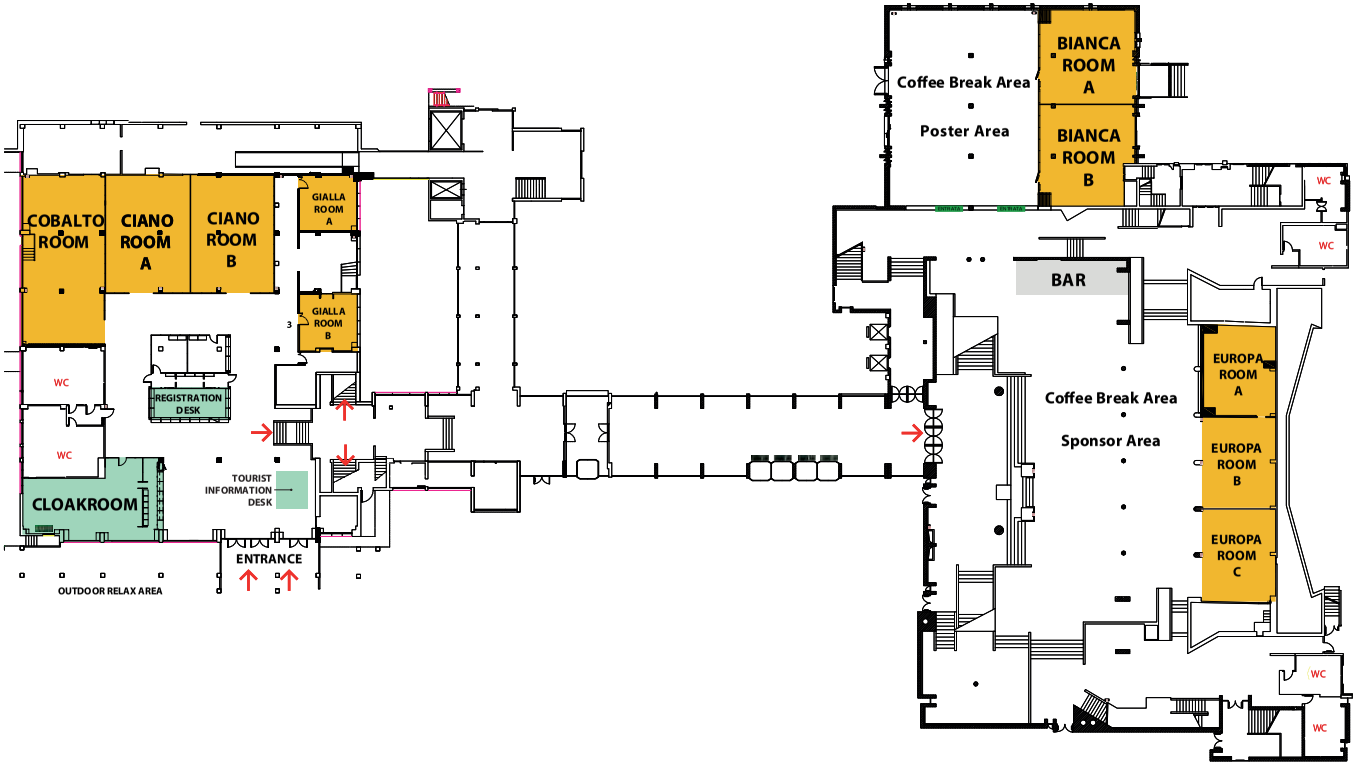
Coffee breaks will be served in the *"Palazzo della Cultura e dei Congressi"* according to the program. Please make full use of the various service points to avoid queues. Luncheons will be served at the Lunch Area on the 1st floor.

**WIRELESS INTERNET CONNECTION**

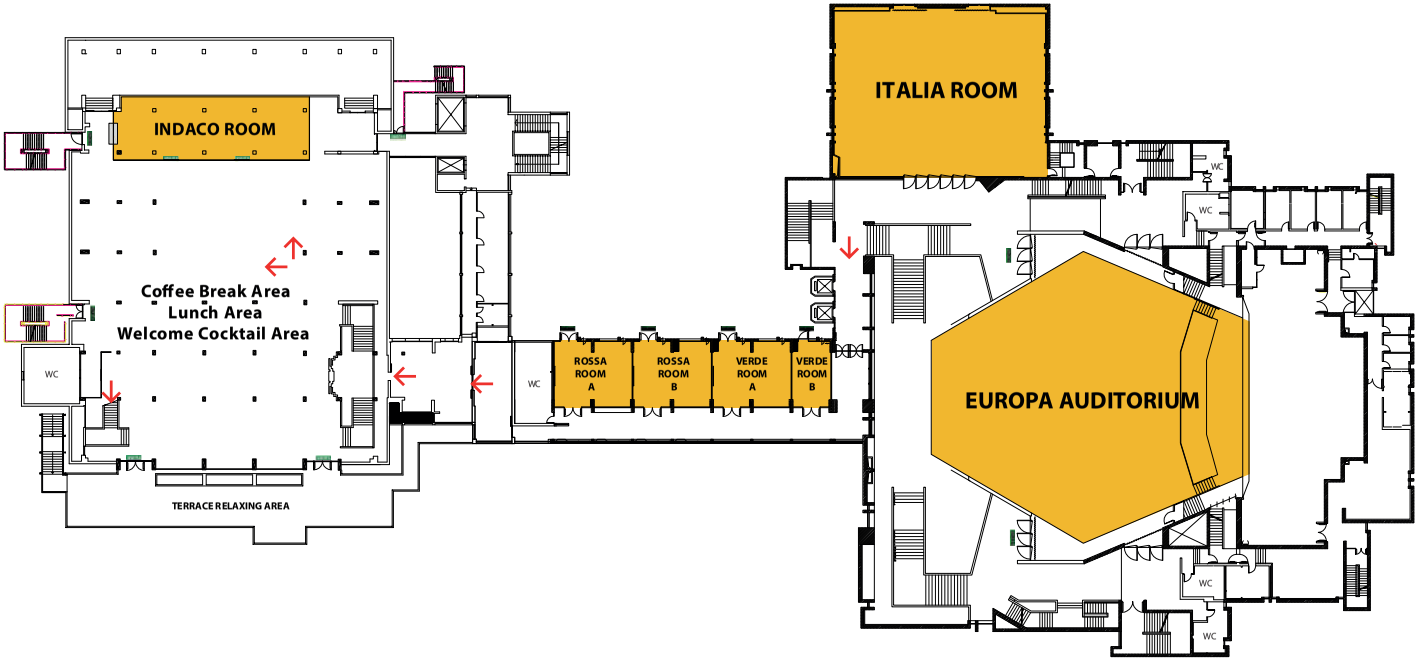
The ESMC2018 has enabled a specific Wi-Fi network for ESMC delegates in *"Palazzo della Cultura e dei Congressi"*.

**WIFI: ESMC**
**PASSWORD: esmc2018**

# Ground Floor



# First Floor


INDACO ROOM
ITALIA ROOM
Coffee Break Area
Lunch Area
Welcome Cocktail Area
WC
TERRACE RELAXING AREA
ROSSA ROOM A
ROSSA ROOM B
VERDE ROOM A
VERDE ROOM B
EUROPA AUDITORIUM
WC
WC
WC
WC

# Second Floor

# Timetable

## Monday, July 2, 2018

| | | |
|---|---|---|
| 09.30-10.00 | **Opening cerimony**<br>**ROOM: Europa Auditorium** | Morning Session |
| 10.00-10.45 | **Plenary Lecture**<br>**ROOM: Europa Auditorium** | |
| 10.45-11.15 | **COFFEE BREAK (ground floor and 1st floor)** | |
| 11.15-13.15 | **Structual Analysis of Real Historic Buildings**<br>**ROOM: Cobalto** | |
| 11.15-13.15 | **Cell Mechanics**<br>**ROOM: Ciano A** | |
| 11.15-13.15 | **Multiscale Modelling of Polycrystalline Materials**<br>**ROOM: Ciano B** | |
| 11.15-13.15 | **Shape Memory Alloys and Related Materials - Modelling, Numerical Algorithms and Applications**<br>**ROOM: Gialla A** | |
| 11.15-13.15 | **Advances in Analytical and Discretization Methods for Discontinuities and Singularities**<br>**ROOM: Bianca A** | |
| 11.15-13.15 | **Mechanics of Materials (General Session)**<br>**ROOM: Bianca B** | |
| 11.15-13.15 | **Micro and Nanomechanics Systems**<br>**ROOM: Europa A** | |
| 11.15-13.15 | **Homogenization Strategies for Multiphase and Active Materials**<br>**ROOM: Europa B** | |
| 11.15-13.15 | **Instabilities in Structural Mechanics and Fluid-Structure Interactions**<br>**ROOM: Europa C** | |
| 11.15-13.15 | **Architected Materials**<br>**ROOM: Indaco** | |

## Monday, July 2, 2018

| | |
|---|---|
| 11.15-13.15 | **Young Researcher Awards Finalists**<br>**ROOM: Rossa A** |
| 11.15-13.15 | **Advanced Strategies for Computational Modelling of Material Failure**<br>**ROOM: Rossa B** |
| 11.15-13.15 | **Experimental Mechanics (General Session)**<br>**ROOM: Verde A** |
| 11.15-13.15 | **Reaction Diffusion Problem in Mechanics**<br>**ROOM: Verde B** |
| 11.15-13.15 | **Mechanics and Physics of Solids and Structures**<br>**ROOM: Italia** |
| 11.15-13.15 | **Symposium honouring Prof. Fleck on the occasion of his 60th birthday**<br>**ROOM: Europa Auditorium** |
| 11.15-13.15 | **Fatigue and Tribology**<br>**ROOM: Celeste** |
| 11.15-13.15 | **Biomechanics (General Session)**<br>**ROOM: Magenta A** |
| 11.15-13.15 | **Nonlinear Elasticity**<br>**ROOM: Magenta B** |
| 13.15-14.45 | LUNCH (1st floor) |
| 14.45-16.45 | **Structual Analysis of Real Historic Buildings** Afternoon Session<br>**ROOM: Cobalto** |
| 14.45-16.45 | **Cell Mechanics**<br>**ROOM: Ciano A** |
| 14.45-16.45 | **Multiscale Modelling of Polycrystalline Materials**<br>**ROOM: Ciano B** |

## Monday, July 2, 2018

| | |
|---|---|
| 14.45-16.45 | **Shape Memory Alloys and Related Materials - Modelling, Numerical Algorithms and Applications**<br>**ROOM: Gialla A** |
| 14.45-16.45 | **Advances in Analytical and Discretization Methods for Discontinuities and Singularities**<br>**ROOM: Bianca A** |
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| 14.45-16.45 | **Micro and Nanomechanics Systems**<br>**ROOM: Europa A** |
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| 14.45-16.45 | **Instabilities in Structural Mechanics and Fluid-Structure Interactions**<br>**ROOM: Europa C** |
| 14.45-16.45 | **Architected Materials**<br>**ROOM: Indaco** |
| 14.45-16.45 | **Young Researcher Awards Finalists**<br>**ROOM: Rossa A** |
| 14.45-16.45 | **Advanced Strategies for Computational Modelling of Material Failure**<br>**ROOM: Rossa B** |
| 14.45-16.45 | **Experimental Mechanics (General Session)**<br>**ROOM: Verde A** |
| 14.45-16.45 | **Beam, Plate and Shell Finite Elements based on non-Classical Theories of Structures**<br>**ROOM: Verde B** |
| 14.45-16.45 | **Mechanics and Physics of Solids and Structures**<br>**ROOM: Italia** |

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| 14.45-16.45 | **Symposium honouring Prof. Fleck on the occasion of his 60th birthday**<br>**ROOM: Europa Auditorium** |
| 14.45-16.45 | **Fatigue and Tribology**<br>**ROOM: Celeste** |
| 14.45-16.45 | **Biomechanics (General Session)**<br>**ROOM: Magenta A** |
| 14.45-16.45 | **Nonlinear Elasticity**<br>**ROOM: Magenta B** |
| 16.45-17.15 | COFFEE BREAK (ground floor and 1st floor) |
| 17.15-19.15 | **Structual Analysis of Real Historic Buildings** Evening session II<br>**ROOM: Cobalto** |
| 17.15-19.15 | **Structual Analysis of Real Historic Buildings**<br>ROOM: Cobalto |
| 17.15-19.15 | **Cell Mechanics**<br>ROOM: Ciano A |
| 17.15-19.15 | **Multiscale Modelling of Polycrystalline Materials**<br>ROOM: Ciano B |
| 17.15-19.15 | **Advances in Analytical and Discretization Methods for Discontinuities and Singularities**<br>ROOM: Bianca A |
| 17.15-19.15 | **Mechanics of Materials (General Session)**<br>ROOM: Bianca B |
| 17.15-19.15 | **Micro and Nanomechanics Systems**<br>ROOM: Europa A |
| 17.15-19.15 | **Homogenization Strategies for Multiphase and Active Materials**<br>**ROOM: Europa B** |
| 17.15-19.15 | **Instabilities in Structural Mechanics and Fluid-Structure Interactions**<br>**ROOM: Europa C** |

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| 17.15-19.15 | **Architected Materials**<br>**ROOM: Indaco** |
| 17.15-19.15 | **Mechanics in energy harvesting and storage**<br>**ROOM: Rossa A** |
| 17.15-19.15 | **Advanced Strategies for Computational Modelling of Material Failure**<br>**ROOM: Rossa B** |
| 17.15-19.15 | **Experimental Micromechanics and Nanomechanics**<br>**ROOM: Verde A** |
| 17.15-19.15 | **Beam, Plate and Shell Finite Elements based on non-Classical Theories of Structures**<br>**ROOM: Verde B** |
| 17.15-19.15 | **Mechanics and Physics of Solids and Structures**<br>**ROOM: Italia** |
| 17.15-19.15 | **Symposium honouring Prof. Fleck on the occasion of his 60th birthday**<br>**ROOM: Europa Auditorium** |
| 17.15-19.15 | **Fatigue and Tribology**<br>**ROOM: Celeste** |
| 17.15-19.15 | **Nonlinear Dynamics in Mechanical and Structural Systems**<br>**ROOM: Magenta A** |
| 17.15-19.15 | **Nonlinear Elasticity**<br>**ROOM: Magenta B** |
| 19.15 | WELCOME RECEPTION (1st floor) |

## Tuesday, July 3, 2018

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|---|---|---|
| 09.00-09.45 | **Plenary Lecture**<br>ROOM: Europa Auditorium | Morning Session |
| 09.45 - 10.15 | COFFEE BREAK (ground floor and 1st floor) | |
| 10.15-12.15 | **Structual Analysis of Real Historic Buildings**<br>**ROOM: Cobalto** | |

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| 10.15-12.15 | **Cardiovascular Biomechanics and Mechanobiology: from Basics to Clinical Applications**<br>**ROOM: Ciano A** |
| 10.15-12.15 | **Multiscale Modelling of Polycrystalline Materials**<br>**ROOM: Ciano B** |
| 10.15-12.15 | **Geometry and Discretization**<br>**ROOM: Gialla A** |
| 10.15-12.15 | **Recent advances in damage mechanics**<br>**ROOM: Bianca A** |
| 10.15-12.15 | **Modelling of Additive Manufacturing Processes**<br>**ROOM: Bianca B** |
| 10.15-12.15 | **Micro and Nanomechanics Systems**<br>**ROOM: Europa A** |
| 10.15-12.15 | **Homogenization Strategies for Multiphase and Active Materials**<br>**ROOM: Europa B** |
| 10.15-12.15 | **Mechanics of Tensegrity Structures and Multifunctional Lattice Materials**<br>**ROOM: Europa C** |
| 10.15-12.15 | **Mechanics in energy harvesting and storage**<br>**ROOM**: **Rossa A** |
| 10.15-12.15 | **Mechanics and Shape Control of Biological Membranes and Thin Structures**<br>**ROOM: Rossa B** |
| 10.15-12.15 | **Experimental Micromechanics and Nanomechanics**<br>**ROOM: Verde A** |
| 10.15-12.15 | **Dynamic Failure and Phase Transition in Structured Media**<br>**ROOM: Verde B** |
| 10.15-12.15 | **Mechanics and Physics of Solids and Structures**<br>**ROOM: Italia** |
| 10.15-12.15 | **Symposium honouring Prof. Fleck on the occasion of his 60th birthday**<br>**ROOM: Europa Auditorium** |
| 10.15-12.15 | **Material Instabilities**<br>**ROOM**: **Celeste** |

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| 10.15-12.15 | **Modelling of Fracture in Hard and Soft materials**<br>**ROOM: Magenta A** | |
| 10.15-12.15 | **Nonlinear Elasticity**<br>**ROOM: Magenta B** | |
| 12.15-13.45 | LUNCH (1st floor) | |
| 13.45-14.30 | **Plenary Lecture**<br>**ROOM: Europa Auditorium** | Afternoon Session |
| 14.30-16.30 | **Structual Analysis of Real Historic Buildings**<br>**ROOM**: **Cobalto** | |
| 14.30-16.30 | **Cardiovascular Biomechanics and Mechanobiology: from Basics to Clinical Applications**<br>**ROOM: Ciano A** | |
| 14.30-16.30 | **Multiscale Modelling of Polycrystalline Materials**<br>**ROOM: Ciano B** | |
| 14.30-16.30 | **Geometry and Discretization**<br>**ROOM**: **Gialla A** | |
| 14.30-16.30 | **Models and Numerical Methods for Coupled Problems in Mechanics**<br>**ROOM: Gialla B** | |
| 14.30-16.30 | **Recent advances in damage mechanics**<br>**ROOM: Bianca A** | |
| 14.30-16.30 | **Structural Mechanics (General Session)**<br>**ROOM: Bianca B** | |
| 14.30-16.30 | **Mechanics of Textile Composite Reinforcements and Fibrous Materials**<br>**ROOM: Europa A** | |
| 14.30-16.30 | **Homogenization Strategies for Multiphase and Active Materials**<br>**ROOM**: **Europa B** | |
| 14.30-16.30 | **Mechanics of Tensegrity Structures and Multifunctional Lattice Materials**<br>**ROOM: Europa C** | |
| 14.30-16.30 | **Architected Materials**<br>**ROOM: Indaco** | |

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| 14.30-16.30 | **Mechanics in energy harvesting and storage**<br>**ROOM: Rossa A** |
| 14.30-16.30 | **Mechanics and Shape Control of Biological Membranes and Thin Structures**<br>**ROOM: Rossa B** |
| 14.30-16.30 | **Experimental Micromechanics and Nanomechanics**<br>**ROOM: Verde A** |
| 14.30-16.30 | **Dynamic Failure and Phase Transition in Structured Media**<br>**ROOM: Verde B** |
| 14.30-16.30 | **Mechanics and Physics of Solids and Structures**<br>**ROOM: Italia** |
| 14.30-16.30 | **Symposium honouring Prof. Fleck on the occasion of his 60th birthday**<br>**ROOM: Europa Auditorium** |
| 14.30-16.30 | **Material Instabilities**<br>**ROOM**: **Celeste** |
| 14.30-16.30 | **Nonlinear Dynamics in Mechanical and Structural Systems**<br>**ROOM: Magenta A** |
| 14.30-16.30 | **Nonlinear Elasticity**<br>**ROOM: Magenta B** |
| 16.30-17.00 | COFFEE BREAK (ground floor and 1st floor) |
| 17.00-19.00 | **Structual Analysis of Real Historic Buildings** Evening Session<br>**ROOM: Cobalto** |
| 17.00-19.00 | **Cardiovascular Biomechanics and Mechanobiology: from Basics to Clinical Applications**<br>**ROOM: Ciano A** |
| 17.00-19.00 | **Modelling of Fracture in Hard and Sof materials**<br>**ROOM: Ciano B** |
| 17.00-19.00 | **Continuum Mechanics (General Session)**<br>**ROOM: Gialla A** |
| 17.00-19.00 | **Geometry and Discretization**<br>**ROOM: Gialla A** |
| 17.00-19.00 | **Models and Numerical Methods for Coupled Problems in Mechanics**<br>**ROOM: Gialla B** |

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| 17.00-19.00 | **Recent advances in damage mechanics**<br>**ROOM: Bianca A** |
| 17.00-19.00 | **Structural Mechanics (General Session)**<br>**ROOM: Bianca B** |
| 17.00-19.00 | **Mechanics of Textile Composite Reinforcements and Fibrous Materials**<br>**ROOM: Europa A** |
| 17.00-19.00 | **Graphene and Related Materials and Systems**<br>**ROOM: Europa B** |
| 17.00-19.00 | **Mechanics of Tensegrity Structures and Multifunctional Lattice Materials**<br>**ROOM: Europa C** |
| 17.00-19.00 | **Architected Materials**<br>**ROOM**: **Indaco** |
| 17.00-19.00 | **Mechanics in energy harvesting and storage**<br>**ROOM: Rossa A** |
| 17.00-19.00 | **Modelling of Additive Manufacturing Processes**<br>**ROOM: Rossa B** |
| 17.00-19.00 | **Experimental Micromechanics and Nanomechanics**<br>**ROOM: Verde A** |
| 17.00-19.00 | **Inelastic Processes in Heterogeneous Materials: Formulations, Uncertainty Quantification, Computations**<br>**ROOM: Verde B** |
| 17.00-19.00 | **Mechanics and Physics of Solids and Structures**<br>**ROOM: Italia** |
| 17.00-19.00 | **Symposium honouring Prof. Fleck on the occasion of his 60th birthday**<br>**ROOM**: **Europa Auditorium** |
| 17.00-19.00 | **Material Instabilities**<br>**ROOM: Celeste** |
| 17.00-19.00 | **Nonlinear Dynamics in Mechanical and Structural Systems**<br>**ROOM: Magenta A** |
| 17.00-19.00 | **Nonlinear Elasticity**<br>**ROOM: Magenta B** |

# Wednesday, July 4, 2018

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|---|---|---|
| 09.00-09.45 | **Plenary Lecture**<br>**ROOM: Europa Auditorium** | Morning Session |
| 09.45 -10.15 | COFFEE BREAK (ground floor and 1st floor) | |
| 10.15-12.15 | **The Physics of Dense Granular Media**<br>**ROOM: Cobalto** | |
| 10.15-12.15 | **Mechanics of Soft Biological Tissue**<br>**ROOM: Ciano A** | |
| 10.15-12.15 | **Modelling of Fracture in Hard and Sof materials**<br>**ROOM: Ciano B** | |
| 10.15-12.15 | **Elastic Metamaterials**<br>**ROOM: Bianca A** | |
| 10.15-12.15 | **Generalized Continua**<br>**ROOM: Bianca B** | |
| 10.15-12.15 | **Mechanics of Textile Composite Reinforcements and Fibrous Materials**<br>**ROOM: Europa A** | |
| 10.15-12.15 | **Graphene and Related Materials and Systems**<br>**ROOM: Europa B** | |
| 10.15-12.15 | **Mechanics of Tensegrity Structures and Multifunctional Lattice Material**<br>**ROOM: Europa C** | |
| 10.15-12.15 | **Computational Homogenization of Nonlinear Composites**<br>**ROOM: Indaco** | |
| 10.15-12.15 | **Computational Mechanics (General Session)**<br>**ROOM: Rossa A** | |
| 10.15-12.15 | **Dynamics, Waves and Metamaterials**<br>**ROOM: Verde A** | |
| 10.15-12.15 | **Modelling of Additive Manufacturing Processes**<br>**ROOM: Verde A** | |
| 10.15-12.15 | **Composite Materials and Homogenization Theory**<br>**ROOM: Verde B** | |

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| 10.15-12.15 | **Mechanics and Physics of Solids and Structures**<br>**ROOM: Italia** | |
| 10.15-12.15 | **Symposium honouring Prof. Fleck on the occasion of his 60th birthday**<br>**ROOM: Europa Auditorium** | |
| 10.15-12.15 | **Material Instabilities**<br>**ROOM: Celeste** | |
| 10.15-12.15 | **Nonlinear Dynamics in Mechanical and Structural Systems**<br>**ROOM: Magenta A** | |
| 10.15-12.15 | **Nonlinear Elasticity**<br>**ROOM: Magenta B** | |
| 14.30-16.30 | **Mechanics of Silk: from Molecules to Orb-webs**<br>**ROOM: Cobalto** | Afternoon Session |
| 17.00-19.00 | **Mechanics of Silk: from Molecules to Orb-webs**<br>**ROOM: Cobalto** | Evening Session |

## Thursday, July 5, 2018

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|---|---|---|
| 09.00-09.45 | **General Lecture**<br>**ROOM: Europa Auditorium** | Morning Session |
| 09.45 -10.15 | COFFEE BREAK (ground floor and 1st floor) | |
| 10.15-12.15 | **The Physics of Dense Granular Media**<br>**ROOM: Cobalto** | |
| 10.15-12.15 | **Mechanics of Soft Biological Tissue**<br>**ROOM: Ciano A** | |
| 10.15-12.15 | **Modelling of Fracture in Hard and Sof materials**<br>**ROOM: Ciano B** | |
| 10.15-12.15 | **Elastic Metamaterials**<br>**ROOM: Bianca A** | |
| 10.15-12.15 | **Generalized Continua**<br>**ROOM: Bianca B** | |

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| 10.15-12.15 | **Computational Homogenization of Nonlinear Composites**<br>**ROOM: Europa A** | |
| 10.15-12.15 | **Multi-Physics of Solids at Fracture**<br>**ROOM: Europa B** | |
| 10.15-12.15 | **Topology Optimization for Additive Manufacturing**<br>**ROOM**: **Europa C** | |
| 10.15-12.15 | **Variational Methods in Constitutive Modelling for Multi-physics Problems**<br>**ROOM: Indaco** | |
| 10.15-12.15 | **Computational Mechanics (General Session)**<br>**ROOM: Rossa A** | |
| 10.15-12.15 | **Mechanics of Silk: from Molecules to Orb-webs**<br>**ROOM: Rossa B** | |
| 10.15-12.15 | **Dynamics, Waves and Metamaterials (General Session)**<br>**ROOM: Verde A** | |
| 10.15-12.15 | **Mechanics of Mineralised Tissue and Biomaterials**<br>**ROOM: Verde B** | |
| 10.15-12.15 | **Mechanics and Physics of Solids and Structures**<br>**ROOM: Italia** | |
| 10.15-12.15 | **Contact Mechanics**<br>**ROOM: Europa Auditorium** | |
| 10.15-12.15 | **Mechanics of Generalized Continua with - Mechanics of Cohesion-adhesion Interactions and their Applications to Sizedependent Thin Structures**<br>**ROOM: Celeste** | |
| 10.15-12.15 | **Nonlinear Dynamics in Mechanical and Structural Systems**<br>ROOM: Magenta A | |
| 10.15-12.15 | **Nonlinear Elasticity**<br>**ROOM: Magenta B** | |
| 12.15-13.45 | LUNCH (1st floor) & POSTER SESSION (ground floor) | |
| 13.45-14.30 | **Plenary Lecture**<br>**ROOM: Europa Auditorium** | Afternoon Session |
| 14.30-16.30 | **The Physics of Dense Granular Media**<br>**ROOM**: **Cobalto** | |

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| 14.30-16.30 | **Mechanics of Soft Biological Tissue**<br>**ROOM: Ciano A** |
| 14.30-16.30 | **Modelling of Fracture in Hard and Sof materials**<br>**ROOM**: **Ciano B** |
| 14.30-16.30 | **Elastic Metamaterials**<br>**ROOM: Bianca A** |
| 14.30-16.30 | **Mechanics of Composite Materials**<br>**ROOM**: **Bianca B** |
| 14.30-16.30 | **Computational Homogenization of Nonlinear Composites**<br>**ROOM: Europa A** |
| 14.30-16.30 | **Multi-Physics of Solids at Fracture**<br>**ROOM: Europa B** |
| 14.30-16.30 | **Topology Optimization for Additive Manufacturing**<br>**ROOM: Europa C** |
| 14.30-16.30 | **Variational Methods in Constitutive Modelling for Multi-physics Problems**<br>**ROOM: Indaco** |
| 14.30-16.30 | **Computational Mechanics (General Session)**<br>**ROOM: Rossa A** |
| 14.30-16.30 | **Dynamics, Waves and Metamaterials (General Session)**<br>**ROOM: Verde A** |
| 14.30-16.30 | **Mechanics and Physics of Solids and Structures**<br>**ROOM: Italia** |
| 14.30-16.30 | **Contact Mechanics**<br>**ROOM: Europa Auditorium** |
| 14.30-16.30 | **Mechanics of Generalized Continua with - Mechanics of Cohesion-adhesion Interactions and their Applications to Sizedependent Thin Structures**<br>**ROOM: Celeste** |
| 14.30-16.30 | **Nonlinear Dynamics in Mechanical and Structural Systems**<br>**ROOM: Magenta A** |
| 14.30-16.30 | **Nonlinear Elasticity**<br>**ROOM**: **Magenta B** |
| 16.30-17.00 | COFFEE BREAK (ground floor and 1st floor) |

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|---|---|---|
| 17.00-19.00 | **The Physics of Dense Granular Media**<br>**ROOM: Cobalto** | Evening Session |
| 17.00-19.00 | **Mechanics of Soft Biological Tissue**<br>**ROOM: Ciano A** | |
| 17.00-19.00 | **Steel Structures: Mechanics, Simulation and Testing**<br>**ROOM: Ciano B** | |
| 17.00-19.00 | **Elastic Metamaterials**<br>**ROOM: Bianca A** | |
| 17.00-19.00 | **Mechanics of Composite Materials**<br>**ROOM: Bianca B** | |
| 17.00-19.00 | **Computational Homogenization of Nonlinear Composites**<br>**ROOM: Europa A** | |
| 17.00-19.00 | **Multi-Physics of Solids at Fracture**<br>**ROOM: Europa B** | |
| 17.00-19.00 | **Topology Optimization for Additive Manufacturing**<br>**ROOM: Europa C** | |
| 17.00-19.00 | **Multi-scale Solids and Homogenization**<br>**ROOM: Indaco** | |
| 17.00-19.00 | **Non-local Models for Damage and Fracture**<br>**ROOM: Rossa A** | |
| 17.00-19.00 | **New Concepts for Advanced Materials and Structures**<br>**ROOM**: **Rossa B** | |
| 17.00-19.00 | **Nonlinear waves in solids**<br>**ROOM**: **Verde A** | |
| 17.00-19.00 | **The Virtual Concrete Lab: Modelling the Behaviour of Concrete from Fresh State to Long Term Durability**<br>**ROOM: Verde B** | |
| 17.00-19.00 | **Mechanics and Physics of Solids and Structures**<br>**ROOM**: **Italia** | |
| 17.00-19.00 | **Contact Mechanics**<br>**ROOM: Europa Auditorium** | |

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| 17.00-19.00 | **Mechanics of Generalized Continua with - Mechanics of Cohesion-adhesion Interactions and their Applications to Sizedependent Thin Structures**<br>**ROOM: Celeste** |
| 17.00-19.00 | **Nonlinear Dynamics in Mechanical and Structural Systems**<br>**ROOM: Magenta A** |
| 20.00 | **Conference Dinner**<br>**Palazzo Re Enzo** |

## Friday, July 6, 2018

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|---|---|---|
| 09.00-09.45 | **Solid Mechanics Prize**<br>**ROOM: Europa Auditorium** | Morning Session |
| 09.45-10.15 | COFFEE BREAK (ground floor and 1st floor) | |
| 10.15-12.15 | **The Physics of Dense Granular Media**<br>**ROOM: Cobalto** | |
| 10.15-12.15 | **Mechanics of Soft Biological Tissue**<br>**ROOM: Ciano A** | |
| 10.15-12.15 | **Steel Structures: Mechanics, Simulation and Testing**<br>**ROOM: Ciano B** | |
| 10.15-12.15 | **Mechanics of Granular Media: Experiments, Theory and Modelling**<br>**ROOM: Bianca A** | |
| 10.15-12.15 | **Cohesive-zone Modelling – Advances and Challenges**<br>**ROOM: Bianca B** | |
| 10.15-12.15 | **Micromechanics-based Nonlocal Continuum Models**<br>**ROOM: Europa A** | |
| 10.15-12.15 | **Multi-Physics of Solids at Fracture**<br>**ROOM: Europa B** | |
| 10.15-12.15 | **In situ Characterisation of materials**<br>**ROOM: Europa C** | |
| 10.15-12.15 | **Multi-scale Solids and Homogenization**<br>**ROOM: Indaco** | |

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| 10.15-12.15 | **Non-local Models for Damage and Fracture**<br>**ROOM: Rossa A** | |
| 10.15-12.15 | **Generalized Continua**<br>**ROOM**: **Rossa B** | |
| 10.15-12.15 | **Nonlinear waves in solids**<br>**ROOM: Verde A** | |
| 10.15-12.15 | **Mechanics and Physics of Solids and Structures**<br>**ROOM**: **Italia** | |
| 10.15-12.15 | **Contact Mechanics**<br>**ROOM: Europa Auditorium** | |
| 10.15-12.15 | **Mechanics of Generalized Continua with - Mechanics of Cohesion-adhesion Interactions and their Applications to Sizede-pendent Thin Structures**<br>**ROOM: Celeste** | |
| 10.15-12.15 | **New Concepts for Advanced Materials and Structures**<br>**ROOM: Magenta B** | |
| 12.15-13.45 | LUNCH (1st floor) | |
| 13.45-15.45 | **Mechanics of Soft Biological Tissue**<br>**ROOM: Ciano A** | Afternoon Session |
| 13.45-15.45 | **Steel Structures: Mechanics, Simulation and Testing**<br>**ROOM**: **Ciano B** | |
| 13.45-15.45 | **Mechanics of Granular Media: Experiments, Theory and Modelling**<br>**ROOM: Bianca A** | |
| 13.45-15.45 | **Cohesive-zone Modelling – Advances and Challenges**<br>**ROOM: Bianca B** | |
| 13.45-15.45 | **Micromechanics-based Nonlocal Continuum Models**<br>**ROOM: Europa A** | |
| 13.45-15.45 | **Multi-Physics of Solids at Fracture**<br>**ROOM: Europa B** | |
| 13.45-15.45 | **In situ Characterisation of materials**<br>**ROOM: Europa C** | |
| 13.45-15.45 | **Multi-scale Solids and Homogenization**<br>**ROOM: Indaco** | |

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| 13.45-15.45 | **Non-local Models for Damage and Fracture**<br>**ROOM: Rossa A** |
| 13.45-15.45 | **Generalized Continua**<br>**ROOM: Rossa B** |
| 13.45-15.45 | **Mechanics and Physics of Solids and Structures**<br>**ROOM: Italia** |
| 13.45-15.45 | **Nonlinear Elasticity**<br>**ROOM:** Magenta B |
| 15.45 | **Closing Cerimony**<br>**ROOM: Europa Auditorium** |

## ESMC 2018 - Monday, July 2, 2018

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|---|---|---|---|---|---|---|---|---|---|---|
| 8:30 | Registration | | | | | | | | | |
| 9:30 | Auditorium - Opening cerimony | | | | | | | | | |
| 10:00 | Europa Auditorium - PLENARY LECTURE<br>Katia Bertoldi (Harvard University)<br>Chair: John Willis | | | | | | | | | |
| 10:45 | Coffee Break | | | | | | | | | |
| | Room Cobalto | Room Ciano A | Room Ciano B | Room Gialla A | Room Gialla B | Room Bianca A | Room Bianca B | Room Europa A | Room Europa B | Room Europa C |
| 11:15 | 7-6<br>7-6 - Structural Analysis of Real Historic Buildings | 2-1<br>2-1 - Cell Mechanics | 1-6<br>1-6 - Multiscale Modelling of Polycrystalline Materials | 1-7<br>1-7 - Shape Memory Alloys and Related Materials - Modelling, Numerical Algorithms and Applications | | 5-7<br>5-7 - Advances in Analytical and Discretization Methods for Discontinuities and Singularities | GS-7<br>General Session: Mechanics of Materials | 1-5<br>1-5 - Micro and Nano Mechanics Systems | 3-2<br>3-2 - Homogenization Strategies for Multiphase and Active Materials | 7-4<br>7-4 - Instabilities in Structural Mechanics and Fluid-Structure Interactions |
| 13:15 | Lunch | | | | | | | | | |
| | Room Cobalto | Room Ciano A | Room Ciano B | Room Gialla A | Room Gialla B | Room Bianca A | Room Bianca B | Room Europa A | Room Europa B | Room Europa C |
| 14:45 | 7-6<br>7-6 - Structural Analysis of Real Historic Buildings | 2-1<br>2-1 - Cell Mechanics | 1-6<br>1-6 - Multiscale Modelling of Polycrystalline Materials | 1-7<br>1-7 - Shape Memory Alloys and Related Materials - Modelling, Numerical Algorithms and Applications | | 5-7<br>5-7 - Advances in Analytical and Discretization Methods for Discontinuities and Singularities | GS-7<br>General Session: Mechanics of Materials | 1-5<br>1-5 - Micro and Nano Mechanics Systems | 3-2<br>3-2 - Homogenization Strategies for Multiphase and Active Materials | 7-4<br>7-4 - Instabilities in Structural Mechanics and Fluid-Structure Interactions |
| 16:45 | Coffee Break | | | | | | | | | |
| | Room Cobalto | Room Ciano A | Room Ciano B | Room Gialla A | Room Gialla B | Room Bianca A | Room Bianca B | Room Europa A | Room Europa B | Room Europa C |
| 17:15 | 7-6<br>7-6 - Structural Analysis of Real Historic Buildings | 2-1<br>2-1 - Cell Mechanics | 1-6<br>1-6 - Multiscale Modelling of Polycrystalline Materials | | | 5-7<br>5-7 - Advances in Analytical and Discretization Methods for Discontinuities and Singularities | GS-7<br>General Session: Mechanics of Materials | 1-5<br>1-5 - Micro and Nano Mechanics Systems | 3-2<br>3-2 - Homogenization Strategies for Multiphase and Active Materials | 7-4<br>7-4 - Instabilities in Structural Mechanics and Fluid-Structure Interactions |
| 19:15 | Welcome Reception | | | | | | | | | |
| | GROUND FLOOR | | | | | | | | | |

EUROPEAN MECHANICS SOCIETY

Registration

Auditorium - Opening cerimony

Europa Auditorium - PLENARY LECTURE
Katia Bertoldi (Harvard University)
Chair: John Willis

Coffee Break

| Room Indaco | Room Rossa A | Room Rossa B | Room Verde A | Room Verde B | Room Italia | Room Europa Auditorium | Room Celeste | Room Magenta A | Room Magenta B |
|---|---|---|---|---|---|---|---|---|---|
| 1-3<br>1-3 - Architected Materials | YRA<br>Young Researcher Awards Finalists | 5-1<br>5-1 - Advanced Strategies for Computational Modelling of Material Failure | GS-6<br>General Session: Experimental Mechanics | 9-2<br>9-2 - Reaction Diffusion Problems in Mechanics | 3-5<br>3-5- Mechanics and Physics of Solids and Structures | 3-14<br>3-14 - Symposium Honouring Professor Norman Fleck on the Occasion of his 60th Birthday | 3-13<br>3-13 - Fatigue and Tribology | GS-1<br>General Session: Biomechanics | 3-7<br>3-7 - Nonlinear Elasticity |

Lunch

| Room Indaco | Room Rossa A | Room Rossa B | Room Verde A | Room Verde B | Room Italia | Room Europa Auditorium | Room Celeste | Room Magenta A | Room Magenta B |
|---|---|---|---|---|---|---|---|---|---|
| 1-3<br>1-3 - Architected Materials | YRA<br>Young Researcher Awards Finalists | 5-1<br>5-1 - Advanced Strategies for Computational Modelling of Material Failure | GS-6<br>General Session: Experimental Mechanics | 7-1<br>7-1 - Beam, Plate and Shell Finite Elements based on non-Classical Theories of Structures | 3-5<br>3-5- Mechanics and Physics of Solids and Structures | 3-14<br>3-14 - Symposium Honouring Professor Norman Fleck on the Occasion of his 60th Birthday | 3-13<br>3-13 - Fatigue and Tribology | GS-1<br>General Session: Biomechanics | 3-7<br>3-7 - Nonlinear Elasticity |

Coffee Break

| Room Indaco | Room Rossa A | Room Rossa B | Room Verde A | Room Verde B | Room Italia | Room Europa Auditorium | Room Celeste | Room Magenta A | Room Magenta B |
|---|---|---|---|---|---|---|---|---|---|
| 1-3<br>1-3 - Architected Materials | 5-6<br>5-6 - Mechanics in Energy Harvesting and Storage | 5-1<br>5-1 - Advanced Strategies for Computational Modelling of Material Failure | 4-1<br>4-1 - Experimental Micromechanics and Nanomechanics | 7-1<br>7-1 - Beam, Plate and Shell Finite Elements based on non-Classical Theories of Structures | 3-5<br>3-5- Mechanics and Physics of Solids and Structures | 3-14<br>3-14 - Symposium Honouring Professor Norman Fleck on the Occasion of his 60th Birthday | 3-13<br>3-13 - Fatigue and Tribology | 6-1<br>6-1 - Nonlinear Dynamics in Mechanical and Structural Systems | 3-7<br>3-7 - Nonlinear Elasticity |

Welcome Reception

FIRST FLOOR | SECOND FLOOR

DAY: Monday, July 2, 2018

## Morning Session

**Opening Cerimony**

ROOM: Europa Auditorium

TIME: 9.30-10.00

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**Plenary Lecture**

DAY: Monday

ROOM: Europa Auditorium

TIME 10.00-10.45

CHAIR: John Willis

**Soft robots: where robotics meets mechanics**

Katia Bertoldi

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Coffee Break 10.45-11.15 - Ground floor and 1st floor

**7-6 - Structual Analysis of Real Historic Buildings** Morning Session

DAY: Monday

ROOM: Cobalto

TIME 11.15-13.15

CHAIR: Maurizio Angelillo, Santiago Huerta

| | | |
|---|---|---|
| **KEYNOTE** | **410** | **The structural engineer's view of ancient buildings**<br>Authors: Jacques Heyman<br>Presenting Author: Jacques Heyman |
| | **318** | **The multiple neighboring solutions for the minimum thickness of a masonry arch**<br>Authors: Nicos Makris, Haris Alexakis<br>Presenting Author: Nicos Makris |
| | **421** | **A continuum approach to describe the collapse mechanisms of masonry walls**<br>Authors: Gianmarco de Felice, Marialaura Malena, Giovanni Tomaselli<br>Presenting Author: Gianmarco de Felice |
| | **251** | **Energy based fracture identification in masonry structures: the case study of the church of "Pietà dei Turchini"**<br>Authors: Antonino Iannuzzo<br>Presenting Author: Antonino Iannuzzo |
| | **485** | **Structural behaviour of the flying buttresses in the cathedral of Mallorca**<br>Authors: Paula Fuentes<br>Presenting Author: Paula Fuentes |

Lunch 13.15 - 14.45 - 1st floor

## 2-1 - Cell Mechanics

Morning Session

DAY: Monday

ROOM: Ciano A

TIME 11.15-13.15

CHAIR: Patrick McGarry, Paolo Bisegna

| | | |
|---|---|---|
| **INVITED** | **988** | **Mechanobiology of Invasive Cancer Cells**<br>Authors: Rakefet Rozen, Martha B. Alvarez-Elizondo, Yulia Merkher, Daphne Weihs<br>Presenting Author: Daphne Weihs |
| **INVITED** | **854** | **Directing the morphology of myoblasts modulates their fusion**<br>Authors: Celine Bruyere, Sylvain Gabriele<br>Presenting Author: Celine Bruyere |
| **INVITED** | **1114** | **Investigation on the mechanisms of cell hardening under uniaxial stretching**<br>Authors: Sabato Fusco, Valeria Panzetta, Paolo Netti<br>Presenting Author: Sabato Fusco |
| **INVITED** | **517** | **Miniaturized elastomer-based pneumatic actuator to measure mechanical properties of cell monolayers**<br>Authors: Francesca Sorba, Alexandre Poulin, Barthélemy Dunan, Michel Despont, Herbert Shea, Cristina Martin-Olmos<br>Presenting Author: Francesca Sorba |
| **INVITED** | **887** | **Migration and differentiation of osteoclast precursors under gradient fluid shear stress**<br>Authors: Bo Huo, Yan Gao, Chongyang Ye<br>Presenting Author: Bo Huo |
| **INVITED** | **456** | **Substrate adhesive area confinement is a key determinant of cell velocity in collective migration**<br>Authors: Danahe Mohammed, Guillaume Charras, Marie Versaevel, Joséphine Lantoine, Laura Alaimo, Céline Bruyère, Marine Luciano, Karine Glinel<br>Presenting Author: Danahe Mohammed |
| **INVITED** | **729** | **A mechano-biological model of the coupling between cellular contractility and VEGFR2/VEGF interactions**<br>Authors: Valentina Damioli, Alberto Salvadori, Gian Paolo Beretta, Cosetta Ravelli, Stefania Mitola, Mattia Serpelloni<br>Presenting Author: Valentina Damioli |

Lunch 13.15 - 14.45 - 1st floor

**1-6 - Multiscale Modelling of Polycrystalline Materials** Morning Session

DAY: Monday

ROOM: Ciano B

TIME 11:15-13.15

CHAIR: Curtin, Beyerlein

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|---|---|---|
| **KEYNOTE** | **979** | **Interface affected plasticity of Mg-layered composites**<br>Authors: Irene Beyerlein, Milan Ardeljan, Manish Jain, Siddhartha Pathak, Marko Knezevic |
| **INVITED** | **728** | **Mechanisms and Modeling of Ductility in Mg Alloys**<br>Authors: William Curtin, Zhaoxuan Wu, Rasool Ahmad, Binglun Yin<br>Presenting Author: William Curtin |
| **INVITED** | **1472** | **Microstructural Predictions of Dynamic Thermo-Mechanical Intergranular and Transgranular Fracture Modes in H.C.P. Alloys**<br>Authors: S. Ziaei, I. Mohamed, M.A. Zikry<br>Presenting Author: M.A. Zikry |
| | **790** | **Grain boundary sliding during creep of polycrystalline austenitic 316H stainless steel: the role of crystal plasticity**<br>Authors: Markian Petkov, Elsiddig Elmukashfi, Edmund Tarleton, Alan Cocks<br>Presenting Author: Markian Petkov |
| | **1066** | **A SPH modelling approach for physics and solid mechanics of engineering materials**<br>Authors: Anxin Ma, Damien Tourret, Javier Llorca, Javier Segurado<br>Presenting Author: Anxin Ma |

Lunch 13.15 - 14.45 - 1st floor

## 1-7 - Shape Memory Alloys and Related Materials - Modelling, Numerical Algorithms and Applications

Morning Session

DAY: Monday

ROOM: Gialla A

TIME 11.15-13.15

CHAIR: Stefanie Reese, Frank Wendler

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| **KEYNOTE** | **1126** | **Behavior of NiTi Shape Memory Alloy under Complex Loading: Numerical Simulation and Comparison with XRD Tomography Experiments**<br>Authors: Petr Sedlak, Miroslav Frost, Petr Šittner, Ludeěk Heller<br>Presenting Author: Petr Sedlak |
| **INVITED** | **1517** | **On the phase-field modelling of displacive transitions**<br>Authors: Alphonse Finel, Juba Hamma, Oguz Umut Salman, Yann Le Bouar<br>Presenting Author: Alphonse Finel |
| **INVITED** | **952** | **Numerical Simulations of Localized Martensitic Transformation in Superelastic NiTi Structures**<br>Authors: Miroslav Frost, Petr Sedlák, Petr Šittner<br>Presenting Author: Miroslav Frost |
| | **628** | **Micromorphic model for modelling Lüders-like bands in shape memory alloys**<br>Authors: Mohsen Rezaee Hajidehi, Stanislaw Stupkiewicz<br>Presenting Author: Stanislaw Stupkiewicz |

Lunch 13.15 - 14.45 - 1st floor

## 5-7 - Advances in Analytical and Discretization Methods for Discontinuities and Singularities

Morning Session

DAY: Monday

ROOM: Bianca A

TIME 11.15-13.15

CHAIR: Benvenuti, Tralli

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|---|---|---|
| KEYNOTE | 276 | **The Virtual Element Method with curved edges**<br>Authors: Lourenço Beirão da Veiga, Alessandro Russo, Giuseppe Vacca<br>Presenting Author: Lourenco Beirao da Veiga |
| INVITED | 240 | **hp Virtual Element Method and a posteriori error analysis**<br>Authors: Lourenço Beirão da Veiga, Lorenzo Mascotto, Gianmarco Manzini<br>Presenting Author: Lorenzo Mascotto |
| INVITED | 312 | **Virtual Element Methods for Linear Elasticity Problems**<br>Authors: Edoardo Artioli, Stefano de Miranda, Carlo Lovadina, Luca Patruno<br>Presenting Author: Carlo Lovadina |
| INVITED | 371 | **Efficient quadrature rules over polyhedral meshes with applications to Discontinuous Galerkin methods**<br>Authors: Paola F. Antonietti, Paul Houston, Giorgio Pennesi<br>Presenting Author: Paola F. Antonietti |

Lunch 13.15 - 14.45 - 1st floor

**GS-7 Mechanics of Materials** Morning Session

DAY: Monday

ROOM: Bianca B

TIME 11.15-13.15

CHAIR: Tristan Seidlhofer, Adam Boyce

**355** **Material Model for Pulp Fibres and Parameter Evaluation Method**

Authors: Tristan Seidlhofer, Ulrich Hirn, Manfred H. Ulz

Presenting Author: Tristan Seidlhofer

**538** **Elasto-plastic indentation of a stiff layer on a foam substrate**

Authors: Adam Boyce, Harika Tankasala, Vikram Deshpande, Norman Fleck

Presenting Author: Adam Boyce

**545** **Stress-dependence of generalized stacking fault energies**

Authors: Predrag Andric, Binglun Yin, William Curtin

Presenting Author: Predrag Andric

**590** **Investigation of aging effects in die casting alloys**

Authors: Maria Angeles Martinez Page, Stefan Hartmann

Presenting Author: Maria Angeles Martinez Page

**1227** **Irrecoverable deformation of metals coupled with DC**

Authors: Andrew Rusinko, Varga Peter

Presenting Author: Rusinko Andrew

**1316** **Identification of constitutive equations, deformation and damage micro-mechanisms of Ti-6Al-4V for aircraft engine fan blades**

Authors: Miguel Ruiz de Sotto, Véronique Doquet, Patrice Longère, Jessica Papasidero

Presenting Author: Miguel Ruiz de Sotto

Lunch 13.15 - 14.45 - 1st floor

## 1-5 - Micro and Nanomechanics Systems

Morning Session

DAY: Monday

ROOM: Europa A

TIME: 11.15-13.15

CHAIR: Attilio Frangi, Vittorio Ferrari

| | | |
|---|---|---|
| KEYNOTE | 543 | **The properties and deformation mechanisms of direct-spun carbon nanotube mats**<br>Authors: Joe Stallard, Wei Tan, Fiona Smail, Thurid Gspann, Adam Boies, Norman Fleck<br>Presenting Author: Joe Stallard |
| | 391 | **Exploiting nonlinear vibrations for material characterization at the nano-scale**<br>Authors: Farbod Alijani, Banafsheh Sajadi, Dejan Davidovikj, Peter Steeneken<br>Presenting Author: Farbod Alijani |
| | 1022 | **Terahertz vibration and resonance phenomena in proteins**<br>Authors: Gianfranco Piana, Giuseppe Lacidogna, Alberto Carpinteri<br>Presenting Author: Gianfranco Piana |
| | 533 | **Robustness of attractors in tapping mode atomic force microscopy**<br>Authors: Pierpaolo Belardinelli, Abhilash Chandrashekar, Urs Staufer, Farbod Alijani<br>Presenting Author: Abhilash Chandrashekar |

Lunch 13.15 - 14.45 - 1st floor

## 3-2 - Homogenization Strategies for Multiphase and Active Materials

Morning Session

DAY: Monday

ROOM: Europa B

TIME: 11:15-13:15

CHAIR: Kostas Danas, Pedro Ponte Castaneda

**836 A new class of incremental variational estimates for the macroscopic response of elasto-viscoplastic composites**

Authors: Michalis Agoras

Presenting Author: Michalis Agoras

**303 Homogenization in nonlinear viscoelasticity: estimates based on the second moments and fluctuations of the fields**

Authors: Mohamed El Bachir Seck, Mihail Garajeu, Renaud Masson

Presenting Author: Renaud Masson

**818 Micromechanical modelling of packing and size effects in particulate elasto-plastic composites**

Authors: Michał Majewski, Katarzyna Kowalczyk-Gajewska, Paweł Hołobut, Michał Kursa

Presenting Author: Michał Majewski

**177 A methodology for the estimation of the effective yield function of isotropic composites with applications to TRIP steels**

Authors: Ioanna Papadioti, Kostas Danas, Nikolaos Aravas

Presenting Author: Ioanna Papadioti

**1311 Heterogeneous microstructure informed computational unit cell modelling of the plastic behaviour of dual-phase steels**

Authors: Karim Ismail, Laurence Brassart, Astrid Perlade, Pascal J. Jacques, Thomas Pardoen

Presenting Author: Karim Ismail

**1445 A finite strain incremental-secant homogenization model for elasto-plastic composites**

Authors: Marieme Imene El Ghezal, Ling Wu, Issam Doghri, Ludovic Noels

Presenting Author: Issam Doghri

Lunch 13.15 - 14.45 - 1st floor

**7-4 - Instabilities in Structural Mechanics and Fluid-Structure Interactions** Morning Session

DAY: Monday

ROOM: Europa C

TIME 11.15-13.15

CHAIR: Arnaud Lazarus, Claudio Mannini

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|---|---|---|
| **INVITED** | **613** | **For Better or For Worse: Self-tuning of the buckling strength of active bilayer shells**<br>Authors: Dong Yan, Anna Lee, Matteo Pezzulla, Francisco López Jiménez, Joel Marthelot, Douglas P. Holmes, Pedro M. Reis<br>Presenting Author: Dong Yan |
| | **696** | **Stability of cylindrical magnets chains**<br>Authors: Corinne Rouby, Jean Boisson, Olivier Doaré, Joosung Lee, Giuseppe Pennisi<br>Presenting Author: Jean Boisson |
| | **296** | **Nonlinear Behaviour, Bifurcations and Instabilities of a Neo-Hookean Pyramidal Truss**<br>Authors: Filipe Fonseca, Paulo Goncalves<br>Presenting Author: Paulo Goncalves |
| | **1058** | **Controlling the Elastic Postbuckling Response of Axially Compressed Thin-walled Cylindrical Shells**<br>Authors: Jun Guo, Rigoberto Burgueno<br>Presenting Author: Rigoberto Burgueno |
| | **379** | **Kinematic Structural Stability of The Beck Column**<br>Authors: Jean Lerbet, Noel Challamel, François Nicot, Félix Darve<br>Presenting Author: Jean Lerbet |
| | **1065** | **Analysis of Thermally-Induced Vibration of Heated Cantilever Beam in Fluid Stream for Lab-on-Chip Applications**<br>Authors: Hamid Naderan<br>Presenting Author: Hamid Naderan |
| | **742** | **Dissipation induced energy harvesting and its effect on flow-induced instabilities of piezoelectric energy harvesters**<br>Authors: Olivier Doaré, Sébastien Michelin, Yifan Xia<br>Presenting Author: Olivier Doaré |

Lunch 13.15 - 14.45 - 1st floor

**1-3 - Architected Materials** Morning Session

DAY: Monday

ROOM: Indaco

TIME 11.15-13.15

CHAIR: Raney, Bertoldi

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|---|---|---|
| 1173 | **Stiffness, strength and fracture toughness of architected materials with spinodal topologies** | Authors: Meng-Ting Hsieh, Yunfei Zhang, Jens Bauer, Lorenzo Valdevit<br>Presenting Author: Lorenzo Valdevit |
| 1505 | **Three-dimensional Architected Composite Materials for Supersonic Impact and Dynamic Applications** | Authors: Carlos Portela<br>Presenting Author: Carlo Portela |
| 1159 | **Ultralight, Highly Compressible Nanoscale Lattice-Truss Materials** | Authors: Andrew Gross, Katia Bertoldi<br>Presenting Author: Andrew Gross |
| 358 | **Enhancing the Ductility and Hardening Behaviour of Fibre Composites using 3D Architectures** | Authors: Lucas Meza, Jim Schormans, Joris Remmers, Vikram Deshpande<br>Presenting Author: Lucas R Meza |
| 698 | **Multicore-Shell Printing of Stiff and Tough Lattice Structures** | Authors: Jochen Mueller, Jordan Raney, Kristina Shea, Jennifer Lewis<br>Presenting Author: Jochen Mueller |
| 606 | **Thermally actuated hierarchical lattices** | Authors: Damiano Pasini, Amr Farag, Hang Xu<br>Presenting Author: Damiano Pasini |

Lunch 13.15 - 14.45 - 1st floor

**Young Researcher Awards Finalists** Morning Session

DAY: Monday

ROOM: Rossa A

TIME 11.15-13.15

CHAIR: Davide Bigoni, Alberto Corigliano

**163** **Nonlinear deformation of multilayer electroactive tubes under different constraints**
Authors: Eliana Bortot
Presenting Author: Eliana Bortot

**172** **Cell expansion and failure during solid-state nanofoaming**
Authors: Frederik Van Loock, Vikram Desphande, Norman Fleck
Presenting Author: Frederik Van Loock

**295** **A Thermodynamically Consistent Model for Magnetic Hysterisis applied to Metallic Magnets and Particle-filled Magnetorheological Elastomers**
Authors: Dipayan Mukherjee, Kostas Danas
Presenting Author: Dipayan Mukherjee

**607** **How does disorder make fracture surfaces rough in brittle materials?**
Authors: Mathias Lebihain, Jean-Baptiste Leblond, Laurent Ponson, Michel Bornert
Presenting Author: Mathias Lebihain

**888** **Efficient two-scale simulations of engineering structures using the Hashin-Shtrikman type Finite Element method (HSFE)**
Authors: Fabiola Cavaliere, Stephan Wulfinghoff, Stefanie Reese
Presenting Author: Fabiola Cavaliere

Lunch 13.15 - 14.45 - 1st floor

## 5-1 - Advanced Strategies for Computational Modelling of Material Failure

Morning Session

DAY: Monday

ROOM: Rossa B

TIME 11.15-13.15

CHAIR: Angelo Simone, Günther Meschke

| | | |
|---|---|---|
| KEYNOTE | 660 | **Design of new materials and structures by Bayesian machine learning and genetic optimization**<br>Authors: Miguel Bessa<br>Presenting Author: Miguel Bessa |
| INVITED | 180 | **Stress-based gradient-enhanced damage models with vanishing length scale**<br>Authors: Bram Vandoren, Angelo Simone<br>Presenting Author: Bram Vandoren |
| INVITED | 1466 | **A displacement-based gradient-enhanced damage model with transient length scale**<br>Authors: Jafar Amani, Rudy Geelen, Antonio Rodriguez-Ferran, Bram Vandoren, John E. Dolbow, Angelo Simone<br>Presenting Author: Angelo Simone |
| INVITED | 1264 | **Non-local damage to crack transition framework for ductile failure based on a cohesive band model**<br>Authors: Van Dung Nguyen, Julien Leclerc, Ling Wu, Ludovic Noels<br>Presenting Author: Van Dung Nguyen |
| INVITED | 1561 | **The open source implementation of an incredibly robust staggered phase-field solution for modeling brittle fracture in Abaqus both in 2D and 3D**<br>Authors: Gergely Molnár, Anthony Gravouil<br>Presenting Author: Gergeley Molnar |

Lunch 13.15 - 14.45 - 1st floor

**GS-6 Experimental Mechanics** Morning Session

DAY: Monday

ROOM: Verde A

TIME 11.15-13.15

CHAIR: Gaëtane Plassart, Christian Düreth

**525** **Effect of crosslinking and long-term storage on thiol-epoxy shape memory polymers by means of Depth Sensing Indentation methods**

Authors: Silvia De la Flor, Alberto Belmonte, Vicente Lorenzo, Xavier Fernández-Francos

Presenting Author: Silvia De la Flor

**583** **Damage mechanisms in a TATB-based PBX**

Authors: Gaëtane Plassart, Didier Picart, Michel Gratton, Arnaud Frachon, Michaël Caliez

Presenting Author: Gaëtane Plassart

**842** **High strain rate behaviour of ice silicate mixtures**

Authors: Shruti Pandey, Ishan Sharma, P. Venkitanarayanan

Presenting Author: Shruti Pandey

**1003** **Experimental and numerical characterisation of the fracture behaviour of novel specimens for superimposed out-of-plane stresses**

Authors: Christian Düreth, Mike Thieme, Holger Böhm, Maik Gude

Presenting Author: Christian Düreth

**1294** **Experimental approach for assessment of materials under extremely high hydrostatic pressures**

Authors: Semion Zhutovsky, Yuri Karinski, David Yankelevsky, Vladimir Feldgun

Presenting Author: Yuri Karinski

Lunch 13.15 - 14.45 - 1st floor

**9-2 - Reaction Diffusion Problem in Mechanics** Morning Session

DAY: Monday

ROOM: Verde B

TIME 11.15-13.15

CHAIR: Davì, Paggi, Ruiz-Bauer

**1281** **An overview of reaction-diffusion systems for material degradation and mechanics with focus on their computational complexity**
Authors: Marco Paggi
Presenting Author: Marco Paggi

**829** **Finite element modelling of crystallization and its effects on the mechanical performance of bio-erodible polymeric scaffolds (BPS)**
Authors: Rosa Shine, Peter E McHugh, William Ronan
Presenting Author: Rosa Shine

**221** **Analysis of augmented mixed finite element methods for coupled stress-diffusion problems**
Authors: Gabriel Gatica, Bryan Gomez, Ricardo Ruiz Baier
Presenting Author: Ricardo Ruiz Baier

**1168** **UV degradation of Poly(lactic acid)**
Authors: Shawn Chester
Presenting Author: Shawn Chester

**217** **A Reaction-Diffusion-Drift Equation in the Continuum Physics of Scintillating Crystals**
Authors: Fabrizio Davì
Presenting Author: Fabrizio Davì

**1259** **Existence results for a physiological electromechanical model of cardiac activity**
Authors: Mostafa Bendahmane, Fatima Mroué, Mazen Saad, Raafat Talhouk
Presenting Author: Fatima Mroué

Lunch 13.15 - 14.45 - 1st floor

**3-5 - Mechanics and Physics of Solids and Structures** Morning Session

DAY: Monday

ROOM: Italia

TIME 11.15-13.15

CHAIR: F. Dal Corso, S. Neukirch

**535** **Kirigami Actuators**

Authors: Marcelo Dias, Michael McCarron, Daniel Rayneau-Kirkhope, Paul Hanakata, David Campbell, Harold Park, Douglas Holmes

Presenting Author: Marcelo Dias

**319** **Structural boundary design and additive manufacturing for polymer structures**

Authors: Grigor Nika, Sylvain Durbeq, Andrei Constantinescu

Presenting Author: Grigor Nika

**1308** **Shaping compliant origami via snap-through instabilities**

Authors: Anne Meeussen, Martin van Hecke

Presenting Author: Anne Meeussen

**576** **Plastic fluctuations in a knitted fabric**

Authors: Samuel Poincloux, Mokhtar Adda-Bedia, Frédéric Lechenault

Presenting Author: Samuel Poincloux

**1258** **Nonlinear Bending of Dielectric Composite Beam Reinforced with Graphene Platelets (GPLs)**

Authors: Chuang Feng, Yu Wang, Zhan Zhao, Jie Yang

Presenting Author: Chuang Feng

**1112** **Instabilities and Pattern Formations in Soft Microstructured Materials**

Authors: Stephan Rudykh, Viacheslav Slesarenko

Presenting Author: Stephan Rudykh

Lunch 13.15 - 14.45 - 1st floor

## 3-14 - Symposium honouring Prof. Fleck on the occasion of his 60th birthday

Morning Session

DAY: Monday

ROOM: Europa Auditorium

TIME 11.15-13.15

CHAIR: John Willis, Martin Idiart

**541 Rate-dependence of Necking Localization Based on a One-dimensional Model**

Authors: Basile Audoly, John Hutchinson

Presenting Author: John Hutchinson

**274 Propagating bulges in cylindrical balloons: analysis based on a one-dimensional model**

Authors: Claire Lestringant, Basile Audoly

Presenting Author: Claire Lestringant

**575 There is nothing like a bending problem: on nature-inspired magnetically-actuated slender structures**

Authors: Patrick Onck

Presenting Author: Patrick Onck

**214 Indentation Analyses for Plant Cells to Determine the Cell Wall Properties**

Authors: Viggo Tvergaard, Alan Needleman

Presenting Author: Viggo Tvergaard

**419 Fretting wear of a friction grip used in an oil and gas well application**

Authors: Alfred R. Akisanya, Jinde Hao, Brent Harrald, Richard D. Neilson

Presenting Author: Alfred Akisanya

**375 Creep crack growth by grain boundary cavitation under cyclic loading**

Authors: Alan Needleman, Jian-Feng Wen, Ankit Srivastava, Amine Benzerga, Shan-Tung Tu

Presenting Author: Alan Needleman

Lunch 13.15 - 14.45 - 1st floor

**3-13 - Fatigue and Tribology** Morning Session

DAY: Monday

ROOM: Celeste

TIME 11.15-13.15

CHAIR: Michele Ciavarella, Enrico Bertocchi

**300** **Fretting fatigue without fretting?**

Authors: Michele Ciavarella, Pietro D'antuono, Antonio Papangelo

Presenting Author: Michele Ciavarella

**1019** **Effect out-of-phase loadings on the life of the Al7050 and CA6NM: experimental and numerical analysis**

Authors: T. Doca, T. Gailliegue, J.A. Araújo

Presenting Author: Thiago Doca

**608** **The effect of normal load frequency on fretting fatigue behavior of Al7075-T6**

Authors: Farshad Abbasi, Gholamhossein Majzoobi

Presenting Author: Farshad Abbasi

**1010** **Slip amplitude assessment at the indenting edge of an interference-fitted shaft-hub connection subject to torsion**

Authors: Enrico Bertocchi, Sara Mantovani, Michele Ciavarella

Presenting Author: Enrico Bertocchi

**289** **The effect of secondary orientation on low cycle fatigue for nickel-based single crystal superalloy**

Authors: Zhiwu He, Wenhui Qiu, Hui-Ji Shi

Presenting Author: Zhiwu He

Lunch 13.15 - 14.45 - 1st floor

**GS-1 Biomechanics** Morning Session

DAY: Monday

ROOM: Magenta A

TIME 11.15-13.15

CHAIR: Gabriele Greco, Sarah Johnson

**226 Resonant frequencies of mouse chromosomes trough mechanical oscillatory model of mitotic spindle**

Authors: Andjelka Hedrih, Katica (Stevanovic) Hedrih

Presenting Author: Andjelka Hedrih

**354 Stag beetle elytra sustains the external loads better using multi-layered structure**

Authors: Lakshminath Kundanati, Stefano Signetti, Himadri S. Gupta, Michele Menegon and Nicola M. Pugno

Presenting Author: Lakshminath Kundanati

**784 In silico simulation of growth and remodeling in biological tissues**

Authors: M. M. A. Peyroteo, J. Belinha, J.A.C.F. Leite Moreira, R. N. Jorge

Presenting Author: M. M. A. Peyroteo

**914 Modelling of cross-linking dynamics in actomyosin networks**

Authors: João Pedro Ferreira, Marco Parente, Renato Natal

Presenting Author: João Pedro Ferreira

**1081 Biomechanical Characterization of Thrombus Material through Experimental and Computational Analysis**

Authors: Sarah Johnson, Michael Gilvarry, Patrick McGarry, Peter McHugh

Presenting Author: Sarah Johnson

**1352 Patient-specific isogeometric analysis of thoracic aortic aneurysm**

Authors: Margherita Coda, Elena Faggiano, Michele Conti, Simone Morganti, Santi Trimarchi, Ferdinando Auricchio, Robert Leroy Taylor, Alessandro Reali

Presenting Author: Margherita Coda

Lunch 13.15 - 14.45 - 1st floor

**3-7 - Nonlinear Elasticity** Morning Session

DAY: Monday

ROOM: Magenta B

TIME 11.15-13.15

CHAIR: Angela Mihai, Luis Dorfmann

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| KEYNOTE | **426** | **Effect of liquid crystal alignment on the mechanical behaviour of liquid crystal elastomers**<br>Authors: Yongzhong Huo, Yang Zhang, Lihua Jin, Chen Xuan<br>Presenting Author: Yongzhong Huo |
| | **680** | **A non-ellipticity result, or the impossible taming of the logarithmic strain measure**<br>Authors: Patrizio Neff, Ionel-Dumitrel Ghiba, Robert J. Martin<br>Presenting Author: Patrizio Neff |
| | **638** | **The number of independent invariants for n symmetric second order tensors**<br>Authors: MHBM Shariff<br>Presenting Author: MHBM Shariff |
| | **262** | **Instability of loops under flexure and twist of Euler's elastica**<br>Authors: Andrej Il'ichev<br>Presenting Author: Andrej Il'ichev |
| | **167** | **An implicit constitutive relation to model the elastic and inelastic behaviour of rock**<br>Authors: Roger Bustamante<br>Presenting Author: Roger Bustamante |

Lunch 13.15 - 14.45 - 1st floor

**7-6 - Structual Analysis of Real Historic Buildings** Afternoon Session

DAY: Monday

ROOM: Cobalto

TIME 14.45-16.45

CHAIR: Maurizio Angelillo, Santiago Huerta

**1088** **Structural Analysis of Cracked Masonry Vaults and Domes**

Authors: John Ochsendorf

Presenting Author: John Ochsendorf

**1083** **On the extension of limit analysis to predict dynamic collapse**

Authors: Matthew DeJong, Anjali Mehrotra

Presenting Author: Matthew DeJong

**1409** **Dynamic behaviour of masonry circular arches with non-negligible tensile strength: impact of tensile strength and pre-existing cracks on collapse mechanisms**

Authors: Alejandra Albuerne, Dina D'Ayala

Presenting Author: Alejandra Albuerne

**1096** **Displacement capacity of masonry structures modeled as a rigid body assembly**

Authors: Antonio Fortunato, Geminiano Mancusi, Fernando Fraternali

Presenting Author: Antonio Fortunato

**787** **A Non-Smooth-Contact-Dynamics approach for the analysis of architectural masonry structures**

Authors: Valentina Beatini, Gianni Royer-Carfagni, Alessandro Tasora

Presenting Author: Valentina Beatini

**1150** **A damage model for the tensile behaviour of Masonry structures**

Authors: Massimiliano Lucchesi, Barbara Pintucchi, Nicola Zani

Presenting Author: Nicola Zani

Coffee Break 16.45-17.15 - Ground floor and 1st floor

**2-1 - Cell Mechanics** Afternoon Session

DAY: Monday

ROOM: Ciano A

TIME 14.45-16.45

CHAIR: Paolo Bisegna, Nicola A. Nodargi

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| **KEYNOTE** | **1503** | **Theoretical modelling of cell and tissue mechanics based on cytoskeletal dynamics**<br>Authors: Marino Arroyo, Sohan Kale, Alejandro Torres-Sanchez, Ernest Latorre, Xavier Trepat, Guillermo Vilanova, Adam Ouzeri<br>Presenting Author: Marino Arroyo |
| **INVITED** | **1365** | **Alternative representation of the activation level in stress fibre directions for the bio-chemo-mechanical model of cell contractility**<br>Authors: Christian R. Bahls, Duy Truong, Ursula van Rienen<br>Presenting Author: Christian R. Bahls |
| **INVITED** | **1177** | **Thermodynamics of Cell Spreading on Ligand Coated Elastic Substrates**<br>Authors: Eoin McEvoy, Vikram Deshpande, Patrick McGarry<br>Presenting Author: Patrick McGarry |
| **INVITED** | **1070** | **A computational model of dynein-microtubule interaction for epithelial cell division orientation**<br>Authors: Myles Kim<br>Presenting Author: Myles Kim |
| **INVITED** | **1158** | **Finite element bendo-tensegrity model of eukaryotic cell in suspended and adherent state**<br>Authors: Yogesh Bansod, Ursula van Rienen, Jiri Bursa<br>Presenting Author: Yogesh Bansod |

Coffee Break 16.45-17.15 - Ground floor and 1st floor

## 1-6 - Multiscale Modelling of Polycrystalline Materials — Afternoon Session

DAY: Monday

ROOM: Ciano B

TIME 14.45-16:45

CHAIR: Delannay, Bassani

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| **INVITED** | **1036** | **Effects of Microstructural Evolution on Strain Localization and Ductile Failures**<br>Authors: John L. Bassani, Kaan Inal, Christoher P. Kohar<br>Presenting Author: John L. Bassani |
| **INVITED** | **1121** | **Crystal plasticity modeling of cyclic plasticity in TWIP steel**<br>Authors: Delannay Laurent, Lin Fengxiang, Jacques Pascal J.<br>Presenting Author: Laurent Delannay |
| | **338** | **Microscale modelling of damage evolution in martensitic steels**<br>Authors: Fengwei Sun, Edward Meade, Noel O'Dowd<br>Presenting Author: Fengwei Sun |
| **INVITED** | **473** | **Meso to Macro Mechanics of Metallic Ductile Damage Under Dynamic Loading Conditions**<br>Authors: Curt Bronkhorst, Hansohl Cho, Hashem Mourad, George Gray, Veronica Livescu, Saryu Fensin, Sabine Zentgraf, Brandon Runnels<br>Presenting Author: Curt Bronkhorst |
| | **942** | **Viscoplastic flow accounting for multilevel hierarchy of shear banding**<br>Authors: Ryszard Pecherski<br>Presenting Author: Ryszard Pecherski |
| | **998** | **Multiscale modeling of titanium aluminide using mean-field and full-field models: towards fatigue lifetime prediction**<br>Authors: Pierre Serrano, Louise Toualbi, Pascale Kanoute, Alain Couret<br>Presenting Author: Pierre Serrano |

Coffee Break 16.45-17.15 - Ground floor and 1st floor

**1-7 - Shape Memory Alloys and Related Materials - Modelling, Numerical Algorithms and Applications** Afternoon Session

DAY: Monday

ROOM: Gialla A

TIME 14.45-16.45

CHAIR: Stanislaw Stupkiewicz, Alphonse Finel

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| **INVITED** | **900** | **Shape Memory Alloy Film Damping**<br>Authors: Manfred Kohl, Shahabeddin Ahmadi, Kiran Jacob, Eckhard Quandt, Frank Wendler<br>Presenting Author: Frank Wendler |
| | **558** | **Development and experimental validation of a constitutive model for NiTi medical devices subjected to fatigue and plasticity**<br>Authors: Lorenza Petrini, Francesca Berti, Elena Villa, Adelaide Nespoli, Francesco Migliavacca<br>Presenting Author: Lorenza Petrini |
| **INVITED** | **211** | **A numerical investigation on the stabilizing effect of plastic deformations on the martensitic transformations in shape memory alloys**<br>Authors: Junker Philipp, Hempel Philipp<br>Presenting Author: Philipp Junker |
| **INVITED** | **926** | **A micromechanical model for polycrystalline shape memory alloy wires integrated into smart structures**<br>Authors: Philippe Hannequart, Michael Peigney, Jean-François Caron, Emmanuel Viglino<br>Presenting Author: Philippe Hannequart |
| **INVITED** | **825** | **Modeling of the one-way and two-way shape-memory effect in semicrystalline polymers**<br>Authors: Giulia Scalet, Stefano Pandini, Ferdinando Auricchio<br>Presenting Author: Giulia Scalet |

Coffee Break 16.45-17.15 - Ground floor and 1st floor

## 5-7 - Advances in Analytical and Discretization Methods for Discontinuities and Singularities

Afternoon Session

DAY: Monday

ROOM: Bianca A

TIME 14.45-16.45

CHAIR: Benvenuti, Tralli

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| **INVITED** | **851** | **Virtual Elements for the Navier-Stokes problem on polygonal meshes**<br>Authors: Lourenco Beirao da Veiga, Carlo Lovadina, Giuseppe Vacca<br>Presenting Author: Giuseppe Vacca |
| **INVITED** | **984** | **FETI-DP for the Virtual Element Method in three dimensions**<br>Authors: Silvia Bertoluzza, Micol Pennacchio, Daniele Prada<br>Presenting Author: Silvia Bertoluzza |
| **INVITED** | **1245** | **Towards an extended Virtual Element Method for 2D elastic problems with displacement discontinuities**<br>Authors: Andrea Chiozzi, Elena Benvenuti, N. Sukumar, Gianmarco Manzini<br>Presenting Author: Andrea Chiozzi |
| **INVITED** | **549** | **An enhanced XFEM for the discontinuous Poisson problem**<br>Authors: Pawel Stapor<br>Presenting Author: Pawel Stapor |
| **INVITED** | **1405** | **Virtual element approximations of a class of unilateral contact problems in linear elasticity**<br>Authors: Andrea Chiozzi, Antonio Tralli<br>Presenting Author: Andrea Chiozzi |

Coffee Break 16.45-17.15 - Ground floor and 1st floor

**GS-7 Mechanics of Materials** Afternoon Session

DAY: Monday

ROOM: Bianca B

TIME 14.45-16.45

CHAIR: Siamak Farajzadeh Khosroshahi, Freek Broere

**767** **Feasibility study of using SPECTRA for motorcyclists' helmet**

Authors: Siamak Farajzadeh Khosroshahi, Alessandro Cernicchi, Mauro Ricotta, Giovanni Meneghetti, Ugo Galvanetto

Presenting Author: Siamak Farajzadeh Khosroshahi

**856** **Torsion of a curved elastic-plastic guidewire**

Authors: Reyhaneh N. Shirazi, Marie Clancy, Caroline Higgins, Ivan Mooney, Peter E. McHugh, William Ronan

Presenting Author: Reyhaneh N. Shirazi

**860** **Correlation of Mechanical Properties with Fracture Surface Features in a Dual-Phase Steel**

Authors: Diego Avendaño-Rodriguez, Lais Mujica-Roncery, Rodolfo Rodríguez-Baracaldo

Presenting Author: Rodolfo Rodríguez-Baracaldo

**910** **Deformation response of EPS foam under combined compression-shear loading: Experimental investigation and FEA numerical simulations**

Authors: Chen Ling, Jan Ivens, Michael Gilchrist

Presenting Author: Chen Ling

**936** **Eshelby Tensor Field for Circular Inclusion with Polynomial Eigenstrain Using Inversion Conformal Mapping**

Authors: Arun Agrawal, Parameswaran Venkitanarayanan

Presenting Author: Arun Agrawal

**1118** **Mechanical Metamaterials as Rigid Body Mechanisms**

Authors: Freek Broeren, Volkert van der Wijk, Just Herder

Presenting Author: Freek Broeren

Coffee Break 16.45-17.15 - Ground floor and 1st floor

## 1-5 - Micro and Nanomechanics Systems

Afternoon Session

DAY: Monday

ROOM: Europa A

TIME: 14.45-16.45

CHAIR: Horacio Espinosa, Maria Pantano

**279** **Phase field modeling of polarization behaviour in ferroelectric materials with defects for MEMS applications**

Authors: Patrick Fedeli, Marc Kamlah, Attilio Frangi

Presenting Author: Patrick Fedeli

**1387** **Design and experimental validation of an auxetic phononic crystal for industrial micro-systems**

Authors: Valentina Zega, Alessandro Nastro, Luca D'Alessandro, Marco Ferrari, Raffaele Ardito, Carlo Valzasina, Vittorio Ferrari, Alberto Corigliano

Presenting Author: Raffaele Ardito

**1262** **A predictive reduced-order finite-elements model for geometrically nonlinear dynamical response of layered piezoelectric nanoplates**

Authors: Arthur Givois, Olivier Thomas, Jean-François Deü

Presenting Author: Arthur Givois

**1024** **Multiphysics modelling and experiments of an air-coupled Piezoelectric Micromachined Ultrasonic Transducer (PMUT)**

Authors: Gianluca Massimino, Raffaele Ardito, Francesco Procopio, Alberto Corigliano

Presenting Author: Gianluca Massimino

**1305** **Scaling Effects of Micromechanical Piezoelectric-on-Silicon Radial Contour Mode Disk Resonators Transduced in Water**

Authors: Abid Ali, Joshua Lee

Presenting Author: Joshua Lee

**634** **Numerical modelling of MEMS resonators**

Authors: Valentina Zega, Attilio Frangi, Andrea Guercilena, Gabriele Gattere

Presenting Author: Valentina Zega

Coffee Break 16.45-17.15 - Ground floor and 1st floor

## 3-2 - Homogenization Strategies for Multiphase and Active Materials

Afternoon Session

DAY: Monday

ROOM: Europa B

TIME: 14:45-16:45

CHAIR: Pedro Ponte Castaneda, Issam Doghri

**384** **A viscoplastic model for porous single crystals containing ellipsoidal voids at finite strains**

Authors: Armel Mbiakop, Kostas Danas, Andrei Constantinescu

Presenting Author: Armel Mbiakop

**870** **Slip transfer at grain boundaries in Al: experimental analysis and numerical simulations**

Authors: Reza Alizadeh, Sara Haouala, Thomas Bieler, Javier Segurado, Jon Molina-Aldareguia, Javier Llorca

Presenting Author: Reza Alizadeh

**557** **A micromechanical model for ductile porous materials with isotropic and linear kinematic hardenable matrix under cyclic loading**

Authors: Long Cheng, Kostas Danas, Andrei Constantinescu, Djimedo Kondo

Presenting Author: Long Cheng

**430** **Ductile rupture under cyclic loading conditions**

Authors: Al Mahdi Remmal, Jean-Baptiste Leblond, Stéphane Marie

Presenting Author: Al Mahdi Remmal

**1134** **Additive tangent Mori-Tanaka approach: validation for elastic -viscoplastic composites under non-proportional loading**

Authors: Katarzyna Kowalczyk-Gajewska, Christophe Czarnota, Sebastien Mercier

Presenting Author: Katarzyna Kowalczyk-Gjewska

**1446** **Porous plasticity: mean field homogenization models coupled with Gurson's solution**

Authors: Marieme Imene El Ghezal, Issam Doghri

Presenting Author: Issam Doghri

Coffee Break 16.45-17.15 - Ground floor and 1st floor

## 7-4 - Instabilities in Structural Mechanics and Fluid-Structure Interactions

Afternoon Session

DAY: Monday

ROOM: Europa C

TIME 14.45-16.45

CHAIR: Jean Lerbet, Vasily Vedeneev

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|---|---|---|
| KEYNOTE | 1116 | **Analysis of stability and bifurcation in non-linear mechanics with dissipation**<br>Authors: Claude Stolz<br>Presenting Author: Claude Stolz |
| INVITED | 508 | **Thermodynamic approach to mechanical and flow instabilities**<br>Authors: Carlos Daniel Díaz-Marín, Alejandro Jenkins<br>Presenting Author: Alejandro Jenkins |
| | 169 | **Energy dissipation through multistable metamaterial under shear**<br>Authors: Suihan Liu, Rigoberto Burgueno<br>Presenting Author: Suihan Liu |
| | 604 | **Navigating among localized states in friction-excited mechanical systems**<br>Authors: Antonio Papangelo, Michele Ciavarella, Norbert Hoffmann<br>Presenting Author: Antonio Papangelo |
| | 624 | **Destabilizing external damping in theory and experiment**<br>Authors: Oleg Kirillov, Davide Bigoni, Mirko Tommasini, Diego Misseroni, Giovanni Noselli<br>Presenting Author: Oleg Kirillov |

Coffee Break 16.45-17.15 - Ground floor and 1st floor

**1-3 - Architected Materials** Afternoon Session

DAY: Monday

ROOM: Indaco

TIME 14.45-16.45

CHAIR: Valdevit, Pasini

**266** **Transition Waves in 2D Bistable Auxetic Structures**

Authors: Katia Bertoldi, Ahmad Rafsanjani, Bolei Deng, Vincent Tournat, Damiano Pasini, Dennis Kochmann

Presenting Author: Katia Bertoldi

**1139** **Multistable Mechanical Metamaterials for 3D Positioning**

Authors: Yong Zhang, Qi Wang, Marcel Tichem, Fred van Keulen

Presenting Author: Yong Zhang

**929** **Generating multistability through anisotropy**

Authors: Evripides Loukaides, Alexandros Ntrekos, Keith Seffen

Presenting Author: Evripides G. Loukaides

**945** **Mechanics of a polymer network with bi-stable chains**

Authors: Roberto Brighenti, Federico Artoni

Presenting Author: Federico Artoni

**1141** **Wave propagation through contact-based elastically asymmetric materials**

Authors: Vladislav Yastrebov

Presenting Author: Vladislav Yastrebov

Coffee Break 16.45-17.15 - Ground floor and 1st floor

**Young Researcher Awards Finalists** Afternoon Session

DAY: Monday

ROOM: Rossa A

TIME 14.45-16.45

CHAIR: Davide Bigoni, Pedro Camanho

**932** **Material modeling in additive manufacturing: Accounting for tailored grain structures using crystal plasticity**

Authors: Andreas Kergaßner, Julia Mergheim, Paul Steinmann

Presenting Author: Andreas Kergaßner

**982** **Subsurface Dislocation Activities under Frictional Slide: A Discrete Dislocation Analysis**

Authors: Yilun Xu, Daniele Dini, Daniel Balint

Presenting Author: Yilun XU

**1023** **Contact guidance of cells can be explained by cellular free-energy minimization and homeostasis**

Authors: Tommaso Ristori, Antonetta Buskermolen, Siamak Shishvan, Nicholas Kurniawan, Carlijn Bouten, Frank Baaijens, Sandra Loerakker, Vikram Deshpande

Presenting Author: Tommaso Ristori

**1064** **Towards low frequency 3D broadband filters via elastic metamaterials**

Authors: Luca D'Alessandro, Raffaele Ardito, Francesco Braghin, Alberto Corigliano

Presenting Author: Luca D'Alessandro

**1296** **Elastica compass, elastica catapult and soft robot arms**

Authors: Costanza Armanini, Francesco Dal Corso, Diego Misseroni, Davide Bigoni

Presenting Author: Costanza Armanini

Coffee Break 16.45-17.15 - Ground floor and 1st floor

## 5-1 - Advanced Strategies for Computational Modelling of Material Failure

Afternoon Session

DAY: Monday

ROOM: Rossa B

TIME 14.45-16.45

CHAIR: Günther Meschke, Angelo Simone

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| **INVITED** | **954** | **The Marching Ridges algorithm: a robust tool for the continuous-to-discontinuous description of failure**<br>Authors: Sylvia Feld-Payet<br>Presenting Author: Sylvia Feld-Payet |
| **INVITED** | **1209** | **Fracture as material sink: Numerical implementation and application in dynamic crack growth**<br>Authors: Anshul Faye, Yoav Lev, K. Y. Volokh<br>Presenting Author: Anshul Faye |
| **INVITED** | **1435** | **Stress intensity factor crack velocity dependence for a moving crack. Numerical investigation.**<br>Authors: Nikita Kazarinov, Roberta Springhetti, Vladimir Bratov, Yuri Petrov<br>Presenting Author: Nikita Kazarinov |
| **INVITED** | **773** | **Microstructure based modelling of thermos-mechanical fatigue in cast iron**<br>Authors: Aslan Mohammadpourshoorbakhlou, Varvara Kouznetsova, Marc Geers<br>Presenting Author: Aslan Mohammadpourshoorbakhlou |
| **INVITED** | **1431** | **Efficient micromechanical modeling of fatigue in composites through time homogenization and reduced-order modeling**<br>Authors: Iuri B C M Rocha, Frans P van der Meer, Lambertus J Sluys<br>Presenting Author: Iuri Rocha |

Coffee Break 16.45-17.15 - Ground floor and 1st floor

**GS-6 Experimental Mechanics** Afternoon Session

DAY: Monday

ROOM: Verde A

TIME 14.45-16.45

CHAIR: Luca Bartolini

**1299** **On the importance of analyses of two opposite faces for wedge splitting tests with DIC**

Authors: Rafael Vargas, Jan Neggers, Rodrigo Bresciani Canto, José de Anchieta Rodrigues, François Hild

Presenting Author: Rafael Vargas

**1342** **On the benefits of applying full-field Digital Image Correlation for dilatometric analysis of PTFE specimen during sintering**

Authors: Vinicius Fiocco Sciuti, Caiuã Caldeira Melo, Rafael Vargas, Rodrigo Bresciani Canto

Presenting Author: Vinicius Fiocco Sciuti

**1378** **Direct comparison of microindentation measurements in the frequency-domain and in the strain-rate domain**

Authors: Luca Bartolini, Davide Iannuzzi, Giorgio Mattei

Presenting Author: Luca Bartolini

Coffee Break 16.45-17.15 - Ground floor and 1st floor

## 7-1 - Beam, Plate and Shell Finite Elements based on non-Classical Theories of Structures

Afternoon Session

DAY: Monday

ROOM: Verde B

TIME 14.45-16.45

CHAIR: Erasmo Carrera, Francisco Chinesta

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| KEYNOTE | 1011 | **Cylindrical shell finite element based on the Reissner's Mixed Variational Theorem with a variable separation method**<br>Authors: Philippe Vidal, Laurent Gallimard, Olivier Polit<br>Presenting Author: Philippe Vidal |
| | 531 | **Effects of geometric nonlinearities on refined structural models of laminated beams**<br>Authors: Alfonso Pagani, Riccardo Augello, Erasmo Carrera<br>Presenting Author: Alfonso Pagani |
| | 561 | **Use of higher-order Legendre polynomials in node-dependent kinematic shell elements**<br>Authors: Guohong Li, Erasmo Carrera, Alberto Garcia de Miguel, Alfonso Pagani, Enrico Zappino<br>Presenting Author: Guohong Li |
| | 766 | **A 2D-plate finite element 3D internally resolved**<br>Authors: Giacomo Quaranta, Fatima Daim, Mustapha Ziane, Emmanuelle Abisset-Chavanne, Jean-Louis Duval, Francisco Chinesta<br>Presenting Author: Giacomo Quaranta |
| | 822 | **The extended shell theory of Nth order: an unified formalism of classical and finite element modeling**<br>Authors: Sergey Zhavoronok, Alexey Kurbatov<br>Presenting Author: Sergey Zhavoronok |

Coffee Break 16.45-17.15 - Ground floor and 1st floor

**3-5 - Mechanics and Physics of Solids and Structures** Afternoon Session

DAY: Monday

ROOM: Italia

TIME 14.45-16.45

CHAIR: B. Roman, N. Vandenberghe

**283 Out-of-plane instability of mixed-mode I+III fatigue and brittle fracture**

Authors: Tristan Cambonie, Alain Karma, Véronique Lazarus

Presenting Author: Véronique Lazarus

**255 Friction is Fracture: a new paradigm for the onset of frictional motion**

Authors: Jay Fineberg, Ilya Svetlizky, Elsa Bayart

Presenting Author: Jay Fineberg

**563 Parameter window for assisted crack tip flipping: Studied by the shear extended Gurson model**

Authors: Kim Lau Nielsen, Christian Lotz Felter

Presenting Author: Kim Lau Nielsen

**1326 Linear (in)stability analysis prediction of the fault angle in damage models**

Authors: Vincent Démery, Véronique Dansereau, Estelle Berthier, Jérôme Weiss, Laurent Ponson

Presenting Author: Vincent Démery

**600 On the stability of straight crack paths in brittle solids under mode I loading**

Authors: Mohamad AbdulMajid, Laurent Ponson

Presenting Author: Mohamad AbdulMajid

**871 Triangular fracture patterns in polymeric materials reveal how crack fronts fragment under mixed mode loading**

Authors: Vasudevan Aditya, Leblond Jean-Baptiste, Ponson Laurent

Presenting Author: Laurent Ponson

Coffee Break 16.45-17.15 - Ground floor and 1st floor

**3-14 - Symposium honouring Prof. Fleck on the occasion of his 60th birthday** Afternoon Session

DAY: Monday

ROOM: Europa Auditorium

TIME 14.45-16.45

CHAIR: John Hutchinson, Partick Onck

**479** **Mechanics of swelling of cellulose foam**

Authors: Norman Fleck, Morad Mirzajanzadeh, Vikram Deshpande

Presenting Author: Norman Fleck

**1136** **Design and Performance of Periodic Trusses**

Authors: Frank Zok, Matthew Begley, Ryan Latture

Presenting Author: Frank Zok

**499** **A Quest for 2D Lattice Materials for Actuation**

Authors: Wiebe Nelissen, Cihan Tekoglu, Can Ayas

Presenting Author: Can Ayas

**268** **On the fracture toughness of truss lattices treated as a quasi-continuum**

Authors: Dennis M. Kochmann, Greg Phlipot

Presenting Author: Dennis M. Kochmann

**1162** **The influence of residual stresses on the fatigue resistance of non-crimp glass fibre reinforced epoxy polymer matrix composites**

Authors: Lars Pilgaard Mikkelsen

Presenting Author: Lars P. Mikkelsen

**411** **Contact problems in the context of couple stress elasticity**

Authors: Thanasis Zisis, Panos Gourgiotis, Haralambos Georgiadis

Presenting Author: Thanasis Zisis

Coffee Break 16.45-17.15 - Ground floor and 1st floor

**3-13 - Fatigue and Tribology** Afternoon Session

DAY: Monday

ROOM: Celeste

TIME 14.45-16.45

CHAIR: Antonio Strozzi, Gianluca Costagliola

**1015** **Influence of the distortion of the conrod big-end bore due to mounting on the tribological behaviour of the conrod/pin coupling**

Authors: Andrea Ferretti, Matteo Giacopini, Alessandro Pulvirenti, Daniele Dini, Stefano Fantoni

Presenting Author: Alessandro Pulvirenti

**455** **Modelling of a conrod small end as a curved beam, and fretting fatigue implications**

Authors: Antonio Strozzi, Enrico Bertocchi, Sara Mantovani

Presenting Author: Antonio Strozzi

**980** **Numerical modeling and experimental tests of friction of structured surfaces**

Authors: Gianluca Costagliola, Alice Berardo, Simone Ghio, Federico Bosia, Nicola M. Pugno

Presenting Author: Gianluca Costagliola

**1147** **Tribochemistry mechanisms in solid and boundary lubrication**

Authors: M. Clelia Righi

Presenting Author: M. Clelia Righi

Coffee Break 16.45-17.15 - Ground floor and 1st floor

**GS-1 Biomechanics** Afternoon Session

DAY: Monday

ROOM: Magenta A

TIME 14.45-16.45

CHAIR: Ana Herrera, Meisam Asgari

**1375** **Stress Induced Calcium Kinetics in a 1D Brain Tissue Geometry**

Authors: Aayush Kant, Nikhil Medhekar, Tanmay Bhandakkar

Presenting Author: Aayush Kant

**1433** **Nanoscale elastic properties of cortical and trabecular femoral bones in adult mice**

Authors: Meisam Asgari, Jad Abi-Rafeh, Geoffrey Hendy, Damiano Pasini

Presenting Author: Meisam Asgari

**1508** **Human cerebral aneurysm tissue: experiment and implications for computational fluid dynamics**

Authors: Daniil Parshin, Alexander Khe, Iulia Kuianova, Nikolay Maslov, Alexander Yunoshev, Konstantin Ovsyannikov, Andrey Dubovoy, Alexander Chupakhin

Presenting Author: Alexander Chupakhin

**1564** **Micromechanics of fibers recruitment in human fibrous tissues**

Authors: Emanuela Bologna, Gioacchino Allotta, Luca Deseri, Massimiliano Zingales

Presenting Author: Luca Deseri

**1487** **Stress shielding in the femur after hip stem optimization**

Authors: Luca Esposito, Paolo Bifulco, Mario Cesarelli, Paolo Gargiulo, Luca Cristofolini, Massimiliano Fraldi

Presenting Author: Luca Esposito

Coffee Break 16.45-17.15 - Ground floor and 1st floor

## 3-7 - Nonlinear Elasticity

Afternoon Session

DAY: Monday

ROOM: Magenta B

TIME 14.45-16.45

CHAIR: Thomas Pence, Alfio Grillo

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|---|---|---|
| KEYNOTE | 943 | **Swelling induced shearing twist in a transversely isotropic hyperelastic annulus**<br>Authors: Thomas Pence, Hasan Demirkoparan<br>Presenting Author: Thomas Pence |
| | 797 | **Quasi-linear viscoelasticity for materials under finite deformation**<br>Authors: Valentina Balbi, Tom Shearer, William Parnell<br>Presenting Author: Valentina Balbi |
| | 806 | **Experimental validation of strain energy functions for porous elastomers**<br>Authors: Michael J. A. Smith, Zeshan Yousaf, William J. Parnell<br>Presenting Author: Michael J. A. Smith |
| | 1301 | **Stress-assisted chemical reactions and reaction blocking effects via chemical affinity tensor**<br>Authors: Alexander Freidin, Leah Sharipova<br>Presenting Author: Alexander Freidin |
| | 1470 | **A thermodynamically based anisotropic finite strain viscoelastic-viscoplastic-damage constitutive model for glassy polymers**<br>Authors: Muralidhar Reddy Gudimetla, Issam Doghri<br>Presenting Author: Muralidhar Reddy Gudimetla |

Coffee Break 16.45-17.15 - Ground floor and 1st floor

**7-6 - Structual Analysis of Real Historic Buildings** Evening Session

DAY: Monday

ROOM: Cobalto

TIME 17.15-19.15

CHAIR: Maurizio Angelillo, Santiago Huerta

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|---|---|---|
| **KEYNOTE** | **261** | **Statical Analysis of the Brunelleschi dome and of its supporting structures**<br>Authors: Mario Como<br>Presenting Author: Mario Como |
| | **382** | **Influence of geometry on seismic capacity of URM buttressed arches**<br>Authors: Giuseppe Brandonisio, Antonello De Luca<br>Presenting Author: Giuseppe Brandonisio |
| | **1499** | **On the micro-modelling of masonry structures**<br>Authors: Antonio Maria D'Altri, Stefano de Miranda, Giovanni Castellazzi, Vasilis Sarhosis<br>Presenting Author: Antonio Maria D'Altri |
| | **762** | **Masonry structures made of monolithic blocks with an application to spiral stairs**<br>Authors: Fabiana De Serio<br>Presenting Author: Fabiana De Serio |
| | **337** | **Analysis of 3D no-tension masonry-like walls**<br>Authors: Matteo Bruggi, Alberto Taliercio<br>Presenting Author: Matteo Bruggi |

Welcome Reception 19.15 - 1st floor

## 2-1 - Cell Mechanics

Evening Session

DAY: Monday

ROOM: Ciano A

TIME 17.15-19.15

CHAIR: Patrick McGarry, Federica Caselli

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|---|---|---|
| **KEYNOTE** | **1383** | **Modeling cell deformations in microflows**<br>Authors: Igor V. Pivkin<br>Presenting Author: Igor V. Pivkin |
| **INVITED** | **1104** | **A reduced model for active contraction in cardiac cells: towards computational efficiency in heart simulation**<br>Authors: Francesco Regazzoni, Luca Dedè, Alfio Quarteroni<br>Presenting Author: Francesco Regazzoni |
| **INVITED** | **956** | **An isogeometric analysis formulation for red blood cell electro-deformation modeling**<br>Authors: Nicola Antonio Nodargi, Paolo Bisegna, Federica Caselli, Laura De Lorenzis<br>Presenting Author: Nicola Antonio Nodargi |
| **INVITED** | **486** | **Poroelastic model to explore cell migration under confinement**<br>Authors: Solenne Deveraux, Rachele Allena, Denis Aubry<br>Presenting Author: Denis Aubry |
| **INVITED** | **1482** | **Mechanics of cells through nonlinear tensegrity structures**<br>Authors: Stefania Palumbo, Arsenio Cutolo, Angelo Rosario Carotenuto, Luca Deseri, Nicola M. Pugno, Massimiliano Fraldi<br>Presenting Author: Stefania Palumbo |

Welcome Reception 19.15 - 1st floor

**1-6 - Multiscale Modelling of Polycrystalline Materials** Evening Session

DAY: Monday

ROOM: Ciano B

TIME 17:15-19:15

CHAIR: Lebensohn, Milton

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|---|---|---|
| **KEYNOTE** | **715** | **A new faster FFT approach using a novel algebra of subspace collections to computing the fields in composites**<br>Authors: Graeme Milton, Herve Moulinec, Pierre Suquet<br>Presenting Author: Graeme W. Milton |
| | **687** | **Polycrystal plasticity models: synergy between full-field and homogenization-based approaches**<br>Authors: Ricardo Lebensohn<br>Presenting Author: Ricardo Lebensohn |
| | **637** | **From microstructure sensitive fatigue models to specimen fatigue life and scatter prediction in polycrystalline superalloys**<br>Authors: Sergio Lucarini, Javier Segurado<br>Presenting Author: Sergio Lucarini |
| **INVITED** | **278** | **Mesoscale Field Dislocation Mechanics solved by EVP-FFT: application to channel-type microstructures and polycrystals**<br>Authors: Komlan S. Djaka, Stephane Berbenni, Vincent Taupin, Ricardo A. Lebensohn<br>Presenting Author: Stephane Berbenni |
| | **893** | **Multi-scale modelling of sheet metal forming by coupling FEM with a CP-Spectral solver using the DAMASK modelling package**<br>Authors: Fengbo Han, Martin Diehl, Franz Roters, Dierk Raabe<br>Presenting Author: Fengbo Han |

Welcome Reception 19.15 - 1st floor

## 5-7 - Advances in Analytical and Discretization Methods for Discontinuities and Singularities

Evening Session

DAY: Monday

ROOM: Bianca A

TIME 17.15-19.15

CHAIR: Benvenuti, Tralli

| | | |
|---|---|---|
| **INVITED** | **1163** | **The X-Fem reloaded** |
| | | Authors: Nunziante Valoroso, Alexandre Martin |
| | | Presenting Author: Nunziante Valoroso |
| **INVITED** | **846** | **A New Stable Immersed Boundary Technique with Direct Essential Boundary Condition Enforcement** |
| | | Authors: Sanne J. van den Boom, Alejandro M. Aragón, Fred van Keulen |
| | | Presenting Author: Sanne J. van den Boom |
| **INVITED** | **1005** | **Mathematical Aspects of Coupled Processes in Fractured Media** |
| | | Authors: Katja K. Hanowski, Oliver Sander |
| | | Presenting Author: Katja K. Hanowski |
| **INVITED** | **521** | **The space-time kernel finite element method (kFEM)** |
| | | Authors: Alessio Quaglino, Toby Simpson, Rolf Krause |
| | | Presenting Author: Alessio Quaglino |

Welcome Reception 19.15 - 1st floor

**GS-7 Mechanics of Materials** Evening Session

DAY: Monday

ROOM: Bianca B

TIME 17.15-19.15

CHAIR: Enrico Radi, Herve Louche

**644 Brazilian test for the characterization of adhesively bonded joints**

Authors: Enrico Radi, Eugenio Dragoni, Andrea Spaggiari

Presenting Author: Enrico Radi

**1317 Anisotropy and temperature dependence of superelastic behavior of NiTi shape memory alloy thin walled tubes.**

Authors: Estephanie Nobre Dantas Grassi, Denis Favier, Gregory Chagnon

Presenting Author: Denis Favier

**1344 Multiscale modeling of interfacial mechanical behavior for magnesium matrix nanocomposites**

Authors: Xia Zhou, Shangyu Song, Guohui Qu

Presenting Author: Xia Zhou

**1379 Membrane wrinkle model: application to an elastoplastic behavior**

Authors: Hugo Le Meitour, Gérard Rio, Hervé Laurent, Frank Petitjean, Julien Troufflard, Anne-Sophie Lectez, Pascale Guigue, Nicolas Poupat

Presenting Author: Hugo, Le Meitour

**1408 Thermomechanical analysis of the deformation in tension of a nanocrystalline superelastic NiTi thin wire**

Authors: Henrique Martinni Ramos De Oliveira, Denis Favier, Herve Louche

Presenting Author: Herve Louche

**1453 A squeezable shallow arch-based 2D structure as a shock absorber device**

Authors: Fabio Bazzucchi, Giuseppe Ferro

Presenting Author: Fabio Bazzucchi

Welcome Reception 19.15 - 1st floor

**1-5 - Micro and Nanomechanics Systems** Evening Session

DAY: Monday

ROOM: Europa A

TIME: 17.15-19.15

CHAIR: Horacio Espinosa, Vittorio Ferrari

**915 Instrumented slider including an array of piezoelectric sensors to measure local micro-impact forces**

Authors: Camille Gregoire, Julien Scheibert, Thibaut Durand, Matthieu Guibert, Manuel Collet, Bernard Laulagnet, Joël Perret-Liaudet

Presenting Author: Camille Gregoire

**465 A novel approach to mechanical design optimization of triaxial MEMS gyroscopes at device-level**

Authors: Daniele Giannini, Francesco Braghin, Matteo Brunetto, Luca Falorni, Gabriele Gattere, Luca Guerinoni, Mohammad Izadi, Ferruccio Resta

Presenting Author: Daniele Giannini

**730 Mutual subharmonic synchronization in a Disk Ring Gyroscope**

Authors: Andrea Guerrieri, Parsa Taheri-Tehrani, Martial Defoort, Attilio Frangi, David A. Horsley

Presenting Author: Andrea Guerrieri

**633 A strategy to widen the linear range of elastic micro-springs**

Authors: Valentina Zega, Claudia Comi, Giacomo Langfelder, Luca Falorni

Presenting Author: Valentina Zega

Welcome Reception 19.15 - 1st floor

**3-2 - Homogenization Strategies for Multiphase and Active Materials**

Evening Session

DAY: Monday

ROOM: Europa B

TIME: 17:15-19:15

CHAIR: Issam Doghri, Kostas Danas

**1135** **Effective creep behaviour of random aggregates during sintering**

Authors: Laurence Brassart, Francis Delannay

Presenting Author: Laurence Brassart

**807** **Estimating internal stresses in viscoelastic composites under thermo-mechanical loadings**

Authors: Noel Lahellec, Hervé Moulinec, Martin Idiart

Presenting Author: Noel Lahellec

**1093** **Self-consistent estimates for the thermoelastic response of cracked polycrystals with hexagonal symmetry**

Authors: François Willot

Presenting Author: François Willot

**482** **The stiffness and strength of epoxy-infilled carbon-nanotube mats**

Authors: Wei Tan, Harika Tankasala, Norman Fleck

Presenting Author: Wei Tan

**951** **Highly porous layers of silica nano-spheres sintered by drying: Scaling up of the elastic properties**

Authors: Arnaud Lesaine, Daniel Bonamy, Georges Gauthier, Cindy Rountree, Véronique Lazarus

Presenting Author: Arnaud Lesaine

**271** **Overall behaviours of multiferroic fibrous composites with interface stress**

Authors: Hsin-Yi Kuo, Kai-Hong Wang

Presenting Author: Hsin-Yi Kuo

Welcome Reception 19.15 - 1st floor

## 7-4 - Instabilities in Structural Mechanics and Fluid-Structure Interactions

Evening Session

DAY: Monday

ROOM: Europa C

TIME 17.15-19.15

CHAIR: Claud Stolz, Alexandro Jenkins

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|---|---|---|
| KEYNOTE | 701 | **Panel flutter: asymptotic global instability analysis and numerical calculations**<br>Authors: Vasily Vedeneev<br>Presenting Author: Vasily Vedeneev |
| INVITED | 341 | **Flutter-induced response of a two-degree-of-freedom plate for energy-harvesting applications**<br>Authors: Luca Pigolotti, Claudio Mannini<br>Presenting Author: Luca Pigolotti |
| | 755 | **Indentation of a floating elastic sheet: Geometry versus applied tension**<br>Authors: Finn Box, Dominic Vella, Robert Style, Jerome Neufeld<br>Presenting Author: Finn Box |
| | 792 | **Dynamic Instability of Flexible Filaments Hanging in Cross Flow**<br>Authors: Jorge Silva-Leon, Andrea Cioncolini, Antonio Filippone<br>Presenting Author: Jorge Silva-Leon |
| | 1111 | **Numerical investigation on the unsteady galloping instability of a rectangular cylinder in turbulent flow**<br>Author: Claudio Mannini<br>Presenting Author: Claudio Mannini |
| | 1131 | **Modal and stability analysis of structures in periodic elastic states: The role of Floquet Forms**<br>Authors: Arnaud Lazarus, Barend Bentvelsen, Corrado Maurini<br>Presenting Author: Arnaud Lazarus |

Welcome Reception 19.15 - 1st floor

**1-3 - Architected Materials** Evening Session

DAY: Monday

ROOM: Indaco

TIME 17.15-19.15

CHAIR: Lucas Meza, Andrew Gross

**688** **Topology optimization of transient thermo-mechanical meta-materials**

Authors: Max van der Kolk, Matthijs Langelaar, Fred van Keulen

Presenting Author: Max van der Kolk

**577** **Homogenization-based multiscale design of truss metamaterials with controllable effective properties**

Authors: Bastian Telgen, Raphael Glaesener, Ole Sigmund, Dennis M. Kochmann

Presenting Author: Bastian Telgen

**676** **Size effects in elastomeric mechanical metamaterials with low scale separation**

Authors: Maqsood Mohammed Ameen, Ondřej Rokoš, Ron Peerlings, Marc Geers

Presenting Author: Maqsood Mohammed Ameen

**1110** **A closed form approximation of the linear effective moduli of periodic foams with octet microstructure**

Authors: George Mejak

Presenting Author: George Mejak

**314** **Crack growth resistance of three-phase two-dimensional lattice materials**

Authors: Harika Tankasala, Norman Fleck

Presenting Author: Harika Tankasala

**1082** **Wave propagation in 3D lattices and random foams**

Authors: Alireza Bayat, Stavros Gaitanaros

Presenting Author: Gaitanaros Stavros

Welcome Reception 19.15 - 1st floor

## 5-6 - Mechanics in energy harvesting and storage

Evening Session

DAY: Monday

ROOM: Rossa A

TIME 17.15-19.15

CHAIR: Alberto Salvadori

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|---|---|---|
| KEYNOTE | 579 | **Modeling and Simulation of Soft Energy Harvesters using Piezoelectric Polymers**<br>Authors: Ralf Denzer<br>Presenting Author: Ralf Denzer |
| | 618 | **Influence of shear on sensing and energy harvesting of ionic polymer metal composites**<br>Authors: Alessandro Leronni, Lorenzo Bardella, Luca Viviani<br>Presenting Author: Lorenzo Bardella |
| | 1025 | **Quantification of the shear flexoelectricity in ferroelectrics**<br>Authors: Alice Mocci, Amir Abdollahi, Irene Arias<br>Presenting Author: Alice Mocci |
| | 363 | **On the influence of leakage current and polarization domains in ferroelectric nanogenerators for energy harvesting**<br>Authors: Franziska J. Wöhler, Ingo Münch, Werner Wagner<br>Presenting Author: FranziskaJ. Wöhler |

Welcome Reception 19.15 - 1st floor

## 5-1 - Advanced Strategies for Computational Modelling of Material Failure

Evening Session

DAY: Monday

ROOM: Rossa B

TIME 17.15-19.15

CHAIR: Günther Meschke, Angelo Simone

| | | |
|---|---|---|
| **INVITED** | **1273** | **Influence of Dislocation Pile-up on Initiation and Propagation of Cleavage Micro-cracks in Ferritic Steels**<br>Authors: Ngoc Anh Giang, Meinhard Kuna, Geralf Hütter<br>Presenting Author: Ngoc Anh Giang |
| | **529** | **Predicting ductile fracture in ferrous and nonferrous metals during upset forging using an ellipsoidal void model**<br>Authors: Kazutake Komori<br>Presenting Author: Kazutake Komori |
| | **574** | **A new approach in modelling beam-column joints suffered from repeated loading based on an innovative joint shear failure mechanism**<br>Authors: Xuan-Hoa Tran, Yoshiro Kai<br>Presenting Author: Xuan Hoa Tran |
| | **1000** | **Variational Interface Model in Solid and Hydraulic Fracturing Problems**<br>Authors: Ildar Khisamitov, Günther Meschke<br>Presenting Author: Günther Meschke |

Welcome Reception 19.15 - 1st floor

## 4-1 - Experimental Micromechanics and Nanomechanics — Evening Session

DAY: Monday

ROOM: Verde A

TIME 17:15-19:15

CHAIR: Gerhard Dehm, Jon Molina-Aldareguia

**769** **Micro-scale fracture and fibre pushout testing of silicon carbide composites for extreme environments**

Authors: David Armstrong, Yevhen Zayachuk

Presenting Author: David Armstrong

**940** **Microstructure influence in cyclic microscale bending: From single-crystalline to ultrafine-grained materials**

Authors: Marlene Kapp, Cameron Howard, Daniel Kiener

Presenting Author: Marlene Kapp

**922** **The brittle-ductile transition of tungsten single crystals at the micro-scale**

Authors: Johannes Ast, Jakob Schwiedrzik, Juri Wehrs, Johann Michler, Xavier Maeder

Presenting Author: Johannes Ast

**881** **A novel material design route for hard coating applications: A combined ab initio and micromechanical study on Mo2BC**

Authors: Bernhard Voelker, Stephan Gleich, Hamid Bolvardi, Christoph Kirchlechner, Christina Scheu, Jochen M. Schneider, Rafael Soler, Gerhard Dehm

Presenting Author: Bernhard Voelker

**340** **Reliability of small scale elasto-plastic fracture mechanical testing**

Authors: Ashish Kumar Saxena, Christoph Kirchlechner, Gerhard Dehm

Presenting Author: Ashish Kumar Saxena

**949** **Characterization of thin adhesive joints under dynamic multiaxial loadings : experiments and modeling**

Authors: Anthony Janin, Andrei Constantinescu, Daniel Weisz-Patrault, Robert Neviere, Matthieu Stackler, William Albouy

Presenting Author: Anthony Janin

Welcome Reception 19.15 - 1st floor

**7-1 - Beam, Plate and Shell Finite Elements based on non-Classical Theories of Structures** Evening Session

DAY: Monday

ROOM: Verde B

TIME 17.15-19.15

CHAIR: Erasmo Carrera, Francisco Chinesta

**976** **Stochastic response of Euler-Bernoulli beams equipped with tuned mass dampers subjected to random moving loads**

Authors: Salvatore Di Lorenzo, Mario Di Paola, Iain Dunn, Giuseppe Failla, Antonina Pirrotta

Presenting Author: Iain Dunn

**1526** **On the robustness of MITC9 shell elements based on CUF**

Authors: Maria Cinefra, Michele D'Ottavio, Oliver Polit, Erasmo Carrera

Presenting Author: Maria Cinefra

**925** **Node-dependent kinematics elements for the analysis of FGM rotating structures**

Authors: Matteo Filippi, Enrico Zappino, Erasmo Carrera

Presenting Author: Enrico Zappino

**974** **New methodology for the construction of Best theory diagrams using neural networks and multi-objective genetic algorithm**

Authors: Jose Luis Mantari, Jorge Yarasca, Gianfranco Canales

Presenting Author: Jorge Yarasca

Welcome Reception 19.15 - 1st floor

**3-5 - Mechanics and Physics of Solids and Structures** Evening Session

DAY: Monday

ROOM: Italia

TIME 17.15-19.15

CHAIR: J. Fineberg, L. Ponson

**616** **Tearing thin sheets: instabilities towards wavy and spiral crack paths**

Authors: Benoit Roman, Eugenio Hamm, Iryna Sivak

Presenting Author: Benoit Roman

**1086** **From tape multiple peeling to membrane delamination simulations**

Authors: Daniele Liprandi, Gianluca Costagliola, Federico Bosia, Nicola M. Pugno

Presenting Author: Daniele Liprandi

**245** **Buckle delamination of thin films on soft substrates: Mexican hat effect and blisters interaction**

Authors: Guillaume Parry, Romain Boijoux, Christophe Coupeau

Presenting Author: Guillaume Parry

**1031** **Adhesion of soft elastic hemispherical shells**

Authors: Miguel Trejo, Suomi Ponce, José Bico, Etienne Reyssat, Benoit Roman, Chung-Yuen Hui

Presenting Author: José Bico

**810** **Mathematical structure of problem of vibration for a beam supporting arbitrary large pre-deformation**

Authors: Le Marrec Loïc, Lerbet Jean, Rakotomanana Lalaonirina

Presenting Author: Le Marrec Loïc

**694** **The statistics of crack initiation in brittle samples**

Authors: Vandenberghe Nicolas, Villermaux Emmanuel

Presenting Author: Nicolas Vandenberghe

Welcome Reception 19.15 - 1st floor

**3-14 - Symposium honouring Prof. Fleck on the occasion of his 60th birthday**

Evening Session

DAY: Monday

ROOM: Europa Auditorium

TIME 17.15-19.15

CHAIR: Robert McMeeking, Kostas Danas

**1178** **Mechanics and chemistry of adhesion**

Authors: Zhigang Suo

Presenting Author: Zhigang Suo

**875** **Poroelastic toughening in polymer gels**

Authors: Giovanni Noselli, Alessandro Lucantonio, Robert M McMeeking, Antonio DeSimone

Presenting Author: Giovanni Noselli

**770** **Coating with colloids**

Authors: Tobias Kraus

Presenting Author: Tobias Kraus

**187** **Structural Batteries and Multifunctional Carbon Composite Materials**

Authors: Dan Zenkert

Presenting Author: Dan Zenkert

**489** **Static space-charge polarization in microstructured solid dielectrics**

Authors: Martin Idiart, Cristian Bottero

Presenting Author: Martin Idiart

**506** **Electro-mechanical theory for nematic continua with an application to Freedericksz instability in 3D liquid crystals**

Authors: Nicolas Triantafyllidis, Konstantinos Danas

Presenting Author: Nicolas Triantafyllidis

Welcome Reception 19.15 - 1st floor

**3-13 - Fatigue and Tribology** Evening Session

DAY: Monday

ROOM: Celeste

TIME 17.15-19.15

CHAIR: Andrei Constantinescu, José A Araujo

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|---|---|---|
| **KEYNOTE** | **244** | **Evolution of roughness during dry sliding: insights from atomistic and mesocale models**<br>Author: Jean-Francois Molinari<br>Presenting Author: Jean-Francois Molinari |
| | **1402** | **Micromechanical modeling for the failure prediction in high-cycle fatigue**<br>Authors: Pierre Baudoin, Eric Charkaluk, Andrei Constantinescu<br>Presenting Author: Andrei Constantinescu |
| | **1418** | **On the multiaxial fatigue behaviour of notched Al 7050-T7451**<br>Authors: Marcus V. C. Sá, Jorge L. A. Ferreira, Cosme R. M. da Silva, José A. Araújo<br>Presenting Author: José A Araújo |
| | **1481** | **Numerical simulations of friction between functionally graded surfaces**<br>Authors: Roberto Guarino, Gianluca Costagliola, Federico Bosia, Nicola M. Pugno<br>Presenting Author: Roberto Guarino |
| | **1351** | **3D anisotropic friction modelling of hierarchical surfaces**<br>Authors: Alice Berardo, Nicola M. Pugno<br>Presenting Author: Alice Berardo |

Welcome Reception 19.15 - 1st floor

**6-1 -Nonlinear Dynamics in Mechanical and Structural Systems**

Evening Session

DAY: Monday

ROOM: Magenta A

TIME 17.15-19.15

CHAIR: Giuseppe Rega, Alois Steindl

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|---|---|---|
| KEYNOTE | 1180 | **Derivation of Nonlinear Damping from Linear Viscoelasticity by a Fractional Standard Solid Model and Application to Nonlinear Vibrations**<br>Author: Marco Amabili<br>Presenting Author: Marco Amabili |
| | 223 | **Auto-parametric response of a non-holonomic system under kinematic excitation**<br>Authors: Jiri Naprstek, Cyril Fischer<br>Presenting Author: Jiri Naprstek |
| | 880 | **Random bouncing ball dynamics under correlated excitation**<br>Authors: Chaïma Zouabi, Joël Perret-Liaudet, Julien Scheibert<br>Presenting Author: Joël Perret-Liaudet |
| | 1016 | **Analysis of explosive aspect ratio in the blast wave: From flat to spherical case**<br>Authors: J.A. Artero-Guerrero, J. Pernas-Sánchez, F. Teixeira-Dias, D. Varas, J. López-Puente<br>Presenting Author: J.A. Artero-Guerrero |
| | 227 | **Trigger of coupled three singular points in dynamics of different mechanical systems each with one degree of freedom**<br>Author: Katica R. (Stevanovic) Hedrih<br>Presenting Author: Katica R. (Stevanovic) Hedrih |

Welcome Reception 19.15 - 1st floor

**3-7 - Nonlinear Elasticity** Evening Session

DAY: Monday

ROOM: Magenta B

TIME 17.15-19.15

CHAIR: Yibin Fu, Roger Bustamante

**159** **A consistent incompressible finite-strain shell model**

Authors: Yuanyou Li, Jiong Wang, Hui-Hui Dai

Presenting Author: Yuanyou Li

**258** **Predicting Poynting effect in coupled shear and tension test in framework of isotropic hyperelasticity**

Authors: Kamel Yaya, Hocine Bechir

Presenting Author: Kamel Yaya

**1426** **Numerical simulation and analysis of the propagation of phase and chemical transformations fronts**

Authors: Aleksandr Morozov, Alexander Freidin, Wolfgang Mueller

Presenting Author: Aleksandr Morozov

**1220** **Tension of thin-walled tube stretched over rough cylinder**

Authors: Alexey Kolesnikov, Alexander Popov

Presenting Author: Alexey Kolesnikov

**1454** **Large strain anisotropic elasticity of auxetic foams**

Authors: Jacopo Ciambella

Presenting Author: Jacopo Ciambella

**1464** **Thermal lateral buckling of railway tracks: a simplified model**

Authors: Mark Bradford, Guotao Yang

Presenting Author: Mark Bradford

Welcome Reception 19.15 - 1st floor

## ESMC 2018 - Tuesday, July 3, 2018

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|---|---|---|---|---|---|---|---|---|---|---|
| 8:30 | Registration | | | | | | | | | |
| 9:00 | Europa Auditorium - PLENARY LECTURE<br>Ray Ogden (Glasgow University)<br>Chair: Luis Dorfmann | | | | | | | | | |
| 9:45 | Coffee Break | | | | | | | | | |
| | Room Cobalto | Room Ciano A | Room Ciano B | Room Gialla A | Room Gialla B | Room Bianca A | Room Bianca B | Room Europa A | Room Europa B | Room Europa C |
| 10:15 | 7-6<br>7-6 - Structural Analysis of Real Historic Buildings | 2-5<br>2-5 - Cardiovascular Biomechanics and Mechanobiology: from Basics to Clinical Applications | 1-6<br>1-6 - Multiscale Modelling of Polycrystalline Materials | 5-3<br>5-3 - Geometry and Discretization | | 3-8<br>3-8 - Recent Advances in Damage Mechanics | 9-4<br>9-4 - Modeling of Additive Manufacturing Processes | 1-5<br>1-5 - Micro and Nano Mechanics Systems | 3-2<br>3-2 - Homogenization Strategies for Multiphase and Active Materials | 7-3<br>7-3 - Mechanics of Tensegrity Structures and Multifunctional Lattice Materials |
| 12:15 | Lunch<br>(Springer Lunch & Learn: Publishing Scientific Research, Nathalie Jacobs - Room Indaco)* | | | | | | | | | |
| 13:45 | Europa Auditorium - PLENARY LECTURE<br>Odd Sture Hopperstad (Norwegian University of Science and Technology)<br>Chair: Claudia Comi | | | | | | | | | |
| | Room Cobalto | Room Ciano A | Room Ciano B | Room Gialla A | Room Gialla B | Room Bianca A | Room Bianca B | Room Europa A | Room Europa B | Room Europa C |
| 14:30 | 7-6<br>7-6 - Structural Analysis of Real Historic Buildings | 2-5<br>2-5 - Cardiovascular Biomechanics and Mechanobiology: from Basics to Clinical Applications | 1-6<br>1-6 - Multiscale Modelling of Polycrystalline Materials | 5-3<br>5-3 - Geometry and Discretization | 5-4<br>5-4 - Models and Numerical Methods for Coupled Problems in Mechanics | 3-8<br>3-8 - Recent Advances in Damage Mechanics | GS-9<br>General Session: Structural Mechanics | 1-4<br>1-4 - Mechanics of Textile Composite Reinforcements and Fibrous Materials | 3-2<br>3-2 - Homogenization Strategies for Multiphase and Active Materials | 7-3<br>7-3 - Mechanics of Tensegrity Structures and Multifunctional Lattice Materials |
| 16:30 | Coffee Break | | | | | | | | | |
| | Room Cobalto | Room Ciano A | Room Ciano B | Room Gialla A | Room Gialla B | Room Bianca A | Room Bianca B | Room Europa A | Room Europa B | Room Europa C |
| 17:00 | 7-6<br>7-6 - Structural Analysis of Real Historic Buildings | 2-5<br>2-5 - Cardiovascular Biomechanics and Mechanobiology: from Basics to Clinical Applications | 1-9<br>1-9 - Modelling of Fracture in Hard and Soft Materials | GS-4<br>General Session: Continuum Mechanics | 5-4<br>5-4 - Models and Numerical Methods for Coupled Problems in Mechanics | 3-8<br>3-8 - Recent Advances in Damage Mechanics | GS-9<br>General Session: Structural Mechanics | 1-4<br>1-4 - Mechanics of Textile Composite Reinforcements and Fibrous Materials | 1-10<br>1-10 - Graphene and Related Materials and Systems | 7-3<br>7-3 - Mechanics of Tensegrity Structures and Multifunctional Lattice Materials |
| 19:00 | GROUND FLOOR | | | | | | | | | |

* The workshop will take place during the lunch break. Please, ask the reception desk for registration.

EUROPEAN MECHANICS SOCIETY

Registration

Europa Auditorium - PLENARY LECTURE
Ray Ogden (Glasgow University)
Chair: Luis Dorfmann

Coffee Break

| Room Indaco | Room Rossa A | Room Rossa B | Room Verde A | Room Verde B | Room Italia | Room Europa Auditorium | Room Celeste | Room Magenta A | Room Magenta B |
|---|---|---|---|---|---|---|---|---|---|
| | 5-6<br>5-6 - Mechanics in Energy Harvesting and Storage | 2-2<br>2-2 - Mechanics and Shape Control of Biological Membranes and Thin Structures | 4-1<br>4-1 - Experimental Micromechanics and Nanomechanics | 6-3<br>6-3 - Dynamic Failure and Phase Transition in Structured Media | 3-5<br>3-5- Mechanics and Physics of Solids and Structures | 3-14<br>3-14 - Symposium Honouring Professor Norman Fleck on the Occasion of his 60th Birthday | 3-3<br>3-3 - Material Instabilities | 1-9<br>1-9 - Modelling of Fracture in Hard and Soft Materials | 3-7<br>3-7 - Nonlinear Elasticity |

Lunch
(Springer Lunch & Learn: Publishing Scientific Research, Nathalie Jacobs - Room Indaco)*

Europa Auditorium - PLENARY LECTURE
Odd Sture Hopperstad (Norwegian University of Science and Technology)
Chair: Claudia Comi

| Room Indaco | Room Rossa A | Room Rossa B | Room Verde A | Room Verde B | Room Italia | Room Europa Auditorium | Room Celeste | Room Magenta A | Room Magenta B |
|---|---|---|---|---|---|---|---|---|---|
| 1-3<br>1-3 - Architected Materials | 5-6<br>5-6 - Mechanics in Energy Harvesting and Storage | 2-2<br>2-2 - Mechanics and Shape Control of Biological Membranes and Thin Structures | 4-1<br>4-1 - Experimental Micromechanics and Nanomechanics | 6-3<br>6-3 - Dynamic Failure and Phase Transition in Structured Media | 3-5<br>3-5- Mechanics and Physics of Solids and Structures | 3-14<br>3-14 - Symposium Honouring Professor Norman Fleck on the Occasion of his 60th Birthday | 3-3<br>3-3 - Material Instabilities | 6-1<br>6-1 - Nonlinear Dynamics in Mechanical and Structural Systems | 3-7<br>3-7 - Nonlinear Elasticity |

Coffee Break

| Room Indaco | Room Rossa A | Room Rossa B | Room Verde A | Room Verde B | Room Italia | Room Europa Auditorium | Room Celeste | Room Magenta A | Room Magenta B |
|---|---|---|---|---|---|---|---|---|---|
| 1-3<br>1-3 - Architected Materials | 5-6<br>5-6 - Mechanics in Energy Harvesting and Storage | 9-4<br>9-4 - Modeling of Additive Manufacturing Processes | 4-1<br>4-1 - Experimental Micromechanics and Nanomechanics | 8-3<br>8-3 - Inelastic Processes in Heterogeneous Materials: Formulations, Uncertainty Quantification, Computations | 3-5<br>3-5- Mechanics and Physics of Solids and Structures | 3-14<br>3-14 - Symposium Honouring Professor Norman Fleck on the Occasion of his 60th Birthday | 3-3<br>3-3 - Material Instabilities | 6-1<br>6-1 - Nonlinear Dynamics in Mechanical and Structural Systems | 3-7<br>3-7 - Nonlinear Elasticity |

FIRST FLOOR | SECOND FLOOR

DAY: Tuesday, July 3, 2018

## Morning Session

**Plenary Lecture**

DAY: Tuesday

ROOM: Europa Auditorium

TIME 9.00-9.45

CHAIR: Luis Dorfmann

**Fibre dispersion moderated elasticity of soft biological tissues**

Ray W. Ogden

Coffee Break 09.45-10.15 - Ground floor and 1st floor

**7-6 - Structual Analysis of Real Historic Buildings** Morning Session

DAY: Tuesday

ROOM: Cobalto

TIME 10.15-12.15

CHAIR: Maurizio Angelillo, Santiago Huerta

| | | |
|---|---|---|
| **KEYNOTE** | **522** | **Masonry arch and vault analysis. A historical outline, from Leonardo da Vinci to Discrete Elements**<br>Authors: Karl-Eugen Kurrer<br>Presenting Author: Karl-Eugen Kurrer |
| | **1385** | **A numerical approach for the determination of the thrust curve for masonry arches of complex shape**<br>Authors: Eleonora Ricci, Aguinaldo Fraddosio, Mario Daniele Piccioni, Elio Sacco<br>Presenting Author: Eleonora Ricci |
| | **672** | **Studying the Dome of Pisa Cathedral via a modern reinterpretation of Durand-Claye's method**<br>Authors: Danila Aita, Riccardo Barsotti, Stefano Bennati<br>Presenting Author: Danila Aita |
| | **488** | **Structural response of masonry vaults via lumped stress method**<br>Authors: Mariella De Piano, Valentino Paolo Berardi, Fernando Fraternali, Luciano Feo, Rosa Penna<br>Presenting Author: Mariella De Piano |
| | **263** | **Equilibrium of masonry helical structures under vertical and horizontal forces: the spiral stair of Certosa di Padula**<br>Authors: Antonio Gesualdo<br>Presenting Author: Antonio Gesualdo |

Lunch 12.15-13.45 - 1st floor

Springer Lunch & Learn: Publishing Scientific Research, Nathalie Jacobs - Room Indaco

## 2-5 - Cardiovascular Biomechanics and Mechanobiology: from Basics to Clinical Applications

Morning Session

DAY: Tuesday

ROOM: Ciano A

TIME 10.15-12.15

CHAIR: A. Veneziani, C. Cyron

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|---|---|---|
| KEYNOTE | 843 | **Coupling strategies for electro-mechanics in the heart**<br>Authors: Marco Favino, Simone Pezzuto, Sonia Pozzi, Seif Ben Bader, Alessio Quaglino, Rolf Krause<br>Presenting Author: Marco Favino |
| INVITED | 160 | **The heart: the only pump the failure of which cannot be assessed through stress analysis**<br>Authors: Jacques M. Huyghe, Peter H.M. Bovendeerd<br>Presenting Author: Jacques M. Huyghe |
| INVITED | 467 | **A Computational Approach for Estimation of the In Vivo Mechanical Material Properties of the Heart Wall from Untagged Images**<br>Authors: Jing Xu, Marc Simon, Timothy Wong, John Brigham<br>Presenting Author: John Brigham |
| INVITED | 946 | **Modeling and high-performance simulation of open-irrigated-catheter cardiac radiofrequency ablation**<br>Authors: Massimiliano Leoni, Argyrios Petras, Luca Gerardo-Giorda, Johan Jansson, Johan Hoffman<br>Presenting Author: Massimiliano Leoni |
| | 1057 | **The Hidden Side Effects of Endovascular Aortic Stenting on Cardiac Function: Shifting the Problem Upstream**<br>Authors: Jamie Concannon, Niamh Hynes, Sherif Sultan, Christof Karmonik, Patrick McGarry, Peter McHugh<br>Presenting Author: Jamie Concannon |
| | 1018 | **Predicting and understanding collagen remodeling in human native heart valves during early development**<br>Authors: Tommaso Ristori, Carlijn Bouten, Frank Baaijens, Sandra Loerakker<br>Presenting Author: Tommaso Ristori |

Lunch 12.15-13.45 - 1st floor

Springer Lunch & Learn: Publishing Scientific Research, Nathalie Jacobs - Room Indaco

**1-6 - Multiscale Modelling of Polycrystalline Materials** Morning Session

DAY: Tuesday

ROOM: Ciano B

TIME 10:15-12:15

CHAIR: Giacomo Po, Anter El-Azab

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|---|---|---|
| **KEYNOTE** | **395** | **Continuum dislocation dynamics modelling of self-organized dislocation structures in crystals**<br>Authors: Anter El-Azab<br>Presenting Author: Anter El-Azab |
| **INVITED** | **873** | **On the effective mobility of BCC dislocations in 2D-Discrete Dislocation Plasticity**<br>Authors: Tarun Katiyar, Erik van der Giessen<br>Presenting Author: Tarun Katiyar |
| **INVITED** | **832** | **Effect of grain size on the strength of FCC polycrystals: strain gradient and mean-free path contributions**<br>Authors: Sarra Haouala, Sergio Lucarini, Javier Segurado, Javier Llorca<br>Presenting Author: Sarra Haouala |
| | **1461** | **Discrete dislocation plasticity investigation of microstructural effects on strain rate sensitivity in titanium alloys**<br>Authors: Sana Waheed, Zebang Zheng, Daniel S. Balint, Fionn P. E. Dunne<br>Presenting Author: Sana Waheed |
| | **1107** | **A novel multiscale approach in modeling of ductile damage in heterogeneous materials**<br>Authors: Tomislav Lesicar, Filip Putar, Jurica Soric, Zdenko Tonkovic<br>Presenting Author: Tomislav Lesicar |

Lunch 12.15-13.45 - 1st floor

Springer Lunch & Learn: Publishing Scientific Research, Nathalie Jacobs - Room Indaco

**5-3 - Geometry and Discretization** Morning Session

DAY: Tuesday

ROOM: Gialla A

TIME 10.15-12.15

CHAIR: A. Reali

**1357 Prostate enlargement due to benign prostatic hyperplasia provides mechanical protection against prostate cancer**

Authors: Guillermo Lorenzo, Pablo Dominguez-Frojan, Alessandro Reali, Hector Gomez

Presenting Author: Guillermo Lorenzo

**664 Force Equilibrium in a Spectral Finite Element Method**

Authors: K. Olesen, B. Gervang, J. N. Reddy, M. Gerritsma

Presenting Author: Bo Gervang

**917 A hybrid equilibrium formulation devoid of spurious kinematic modes. Part I: Lower order approximation.**

Authors: Varun Jain, Yi Zhang, Marc Gerritsma

Presenting Author: Varun Jain

**911 A hybrid equilibrium formulation devoid of spurious kinematic modes. Part II: High order approximation.**

Authors: Yi Zhang, Varun Jain, Marc Gerritsma

Presenting Author: Yi Zhang

Lunch 12.15-13.45 - 1st floor

Springer Lunch & Learn: Publishing Scientific Research, Nathalie Jacobs - Room Indaco

**3-8 - Recent advances in damage mechanics** Morning Session

DAY: Tuesday

ROOM: Bianca A

TIME 10.15-12.15

CHAIR: Jean-Jacques Marigo, Michael Brünig

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| KEYNOTE | 901 | **An isotropic damage cohesive formulation for mixed-mode delamination**<br>Authors: Federica Confalonieri, Umberto Perego<br>Presenting Author: Umberto Perego |
| | 534 | **Numerical insight of a variational smeared approach to cohesive fracture**<br>Authors: Francesco Freddi, Flaviana Iurlano<br>Presenting Author: Flaviana Iurlano |
| | 405 | **Crack nucleation and scale effects in variational phase-field models of brittle fracture**<br>Authors: Corrado Maurini, Blaise Bourdin, Tianyi Li, Erwan Tanne, Jean-Jacques Marigo<br>Presenting Author: Corrado Maurini |
| | 647 | **A variational two-phase model for micro-cracking and strain localization in fiber-reinforced concretes**<br>Authors: Roberto Alessi, Giovanni Lancioni, Stefano Vidoli<br>Presenting Author: Giovanni Lancioni |
| | 960 | **Multi-scale analysis of alkali-silica reaction-induced damage with thermo-mechanical coupling**<br>Authors: Mauro Corrado, Martina Colombo, Claudia Comi, Jean-Francois Molinari<br>Presenting Author: Mauro Corrado |

Lunch 12.15-13.45 - 1st floor

Springer Lunch & Learn: Publishing Scientific Research, Nathalie Jacobs - Room Indaco

## 9-4 - Modeling of Additive Manufacturing Processes

Morning Session

DAY: Tuesday

ROOM: Bianca B

TIME 10.15-12.15

CHAIR: S. Morganti, M. Carraturo

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| KEYNOTE | 1328 | **Microstructural modeling of additive manufacturing processes of Ti6Al4V alloys**<br>Authors: Emilio Salsi, Michele Chiumenti, Miguel Cervera<br>Presenting Author: Emilio Salsi |
| | 1288 | **Micro-scale finite element thermal analysis of metallic powder bed fusion through selective laser melting**<br>Authors: Simone Ancellotti, Alberto Molinari, Matteo Benedetti, Vigilio Fontanari, Dario Pitassi, Valerio Luchin, Gianluca Zappini<br>Presenting Author: Simone Ancellotti |
| | 1283 | **On the modelling and simulation of selective laser melting using a phase transformation approach**<br>Authors: Thorsten Bartel, Isabelle Guschke, Andreas Menzel<br>Presenting Author: Thorsten Bartel |
| | 560 | **Multiscale Thermomechanical Modelling of Powder Bed Fusion Manufacturing**<br>Authors: Wenyou Zhang, Noel Harrison<br>Presenting Author: Wenyou Zhang |
| | 434 | **Three-dimensional analysis of grain structure evolution under additive manufacturing conditions**<br>Authors: Olga Zinovieva, Aleksandr Zinoviev, Vasily Ploshikhin<br>Presenting Author: Olga Zinovieva |

Lunch 12.15-13.45 - 1st floor

Springer Lunch & Learn: Publishing Scientific Research, Nathalie Jacobs - Room Indaco

**1-5 - Micro and Nanomechanics Systems** Morning Session

DAY: Tuesday

ROOM: Europa A

TIME: 10.15-12.15

CHAIR: Attilio Frangi, Maria Pantano

| | | |
|---|---|---|
| | **285** | **Mechanics of folding and collapsing of nanotubes**<br>Authors: Ming Li, Fengwei Li, Hao Li, Zhan Kang<br>Presenting Author: Ming Li |
| | **666** | **A model for the tensile properties of carbon nanotube fibres**<br>Authors: Juan Carlos Fernandez-Toribio, Alvaro Ridruejo, Juan Jose Vilatela<br>Presenting Author: Alvaro Ridruejo |
| **KEYNOTE** | **1183** | **Mechanics of Metallic Nanowires – Stress Relaxation and Diffusion-Mediated Failure**<br>Authors: Horacio Espinosa, Rajaprakash Ramachandramoorthy, Yanming Wang, Amin Aghaei, Gunther Richter, Wei Cai<br>Presenting Author: Horacio Espinosa |
| | **353** | **Grain Growth at the Nanoscale: The Coupling of Stress and Grain Boundary Motion**<br>Authors: Quentin Sherman, Peter Voorhees<br>Presenting Author: Peter Voorhees |
| | **281** | **Investigation of the mechanics of the cell membrane for insertion into a living cell during tip-cell interactions**<br>Authors: Na Fan, Bei Peng, Hai Jiang<br>Presenting Author: Bei Peng |

Lunch 12.15-13.45 - 1st floor

Springer Lunch & Learn: Publishing Scientific Research, Nathalie Jacobs - Room Indaco

## 3-2 - Homogenization Strategies for Multiphase and Active Materials

Morning Session

DAY: Tuesday

ROOM: Europa B

TIME: 10.15-12.15

CHAIR: Nick Triantafyllidis, Pedro Ponte Castaneda

**192** **A general result for the magnetoelastic response of isotropic suspensions of iron and ferrofluid particles in rubber, with applications to spherical and cylindrical specimens**

Authors: Oscar Lopez-Pamies, Victor Lefevre, Kostas Danas

Presenting Author: Oscar Lopez-Pamies

**840** **Multiscale continuum modeling of magnetorheological elastomers**

Authors: Philipp Metsch, Karl Alexander Kalina, Jörg Brummund, Markus Kästner

Presenting Author: Philipp Metsch

**487** **Magnetomechanical macroscopic instabilities in magnetorheological elastomer composites with periodic microstructures**

Authors: Artemii Goshkoderia, Stephan Rudykh

Presenting Author: Artemii Goshkoderia

**972** **Finite Element Simulations and Nonlinear Homogenization of Hyperelastic Fibre Reinforced Elastomer Composites**

Authors: Tilen Ceglar, Heinz Pettermann

Presenting Author: Tilen Ceglar

**1123** **Numerical and experimental study on effective elastic properties of 3D printed controlled random porous material numerically generated**

Authors: Othmane Zerhouni, Gabriella Tarantino, Konstantinos Danas

Presenting Author: Othmane Zerhouni

**1400** **The influence of viscosity and plasticity on the chemical reaction front propagation in solids**

Authors: Svetlana Petrenko, Eric Charkaluk

Presenting Author: Svatlana Petrenko

Lunch 12.15-13.45 - 1st floor

Springer Lunch & Learn: Publishing Scientific Research, Nathalie Jacobs - Room Indaco

**7-3 - Mechanics of Tensegrity Structures and Multifunctional Lattice Materials**

Morning Session

DAY: Tuesday

ROOM: Europa C

TIME 10.15-12.15

CHAIR: Fernando Fraternali, Julian Rimoli

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| **KEYNOTE** | **233** | **Meta-materials with locally addressable properties: from self-folding to autonomous propulsion**<br>Authors: Chiara Daraio<br>Presenting Author: Chiara Daraio |
| | **182** | **On the band-gap structure of tensegrity metamaterials**<br>Authors: Ada Amendola, Anastasiia Krushynska, Chiara Daraio, Nicola M. Pugno, Fernando Fraternali<br>Presenting Author: Ada Amendola |
| | **282** | **Buckling Tensegrity-Based Metamaterials for Dynamic Applications**<br>Authors: Kirsti Pajunen, Paul Johanns, Julian Rimoli, Raj Pal, Chiara Daraio<br>Presenting Author: Kirsti Pajunen |
| | **1130** | **On the nonlinear dynamics of spatial cellular tensegrities**<br>Authors: Andrea Micheletti, Attilio Pizzigoni, Giuseppe Ruscica<br>Presenting Author: Giuseppe Ruscica |
| | **249** | **Lattice models to interpret the experimental response of innovative structural materials**<br>Authors: Ida Mascolo, Mariano Modano, Francesco Fabbrocino, Ilenia Farina, Francesco Colangelo<br>Presenting Author: Ida Mascolo |

Lunch 12.15-13.45 - 1st floor

Springer Lunch & Learn: Publishing Scientific Research, Nathalie Jacobs - Room Indaco

## 5-6 - Mechanics in energy harvesting and storage

Morning Session

DAY: Tuesday

ROOM: Rossa A

TIME 10.15-12.15

CHAIR: Ralf Denzer, Angelo Simone

**878** **Energy harvesting using array of rotating pendulums suspended from axially vibrating rigid rod**

Authors: George Vathakkattil Joseph, Shaikh Faruque Ali, Sayan Gupta, Vikram Pakrashi

Presenting Author: George Vathakkattil Joseph

**1210** **Energy harvesting from bridge vibrations with piezoelectric devices - Analysis of a case study bridge**

Authors: Jacopo Bonari, Davide Colonna, Paolo S. Valvo

Presenting Author: Jacopo Bonari

**374** **Compression sensing of ionic polymer metal composites: influence of the material properties in the polymer/metal interphases**

Authors: Valentina Volpini, Lorenzo Bardella

Presenting Author: Valentina Volpini

**724** **Viscoelasticity-ionic transport interaction in solid polymer electrolytes**

Authors: Davide Grazioli, Andrea Panteghini, Angelo Simone

Presenting Author: Davide Grazioli

**803** **Mechanical response of polymer electrolyte membranes subject to hydration-dehydration cycles**

Authors: Paola Nardinocchi, Eric Puntel, Marco Rossi, Thomas Wallmersperge

Presenting Author: Marco Rossi

**1033** **Chemical and Thermal Stresses in Proton-conducting Membranes**

Authors: John Berger, Alexis Dubois, Kasra Taghikhani, Sandrine Ricote, Robert Kee

Presenting Author: John Berger

Lunch 12.15-13.45 - 1st floor

Springer Lunch & Learn: Publishing Scientific Research, Nathalie Jacobs - Room Indaco

**2-2 - Mechanics and Shape Control of Biological Membranes and Thin Structures** Morning Session

DAY: Tuesday

ROOM: Rossa B

TIME 10.15-12.15

CHAIR: DeSimone, Arroyo, Noselli

**610 Active superelasticity revealed by three-dimensional epithelial sheets of controlled size and shape**

Authors: Ernest Latorre, Sohan Kale, Laura Casares, Manuel Gomez-Gonzalez, Marina Uroz, Léo Valon, Benoit Ladoux, Marino Arroyo

Presenting Author: Ernest Latorre

**1256 Theoretical and computational modelling of epithelial wound closure**

Authors: Lisandro Roldan, Jose Muñoz, Pablo Sáez

Presenting Author: Pablo Sáez

**1144 An ALE formulation for the 3D flow and shape dynamics of cellular membranes**

Authors: Roger Sauer, Amaresh Sahu, Yannick Omar, Kranthi Mandadapu

Presenting Author: Roger Sauer

**1006 Building a three-dimensional model for the cell cortex from the bottom-up: bringing elasticity, remodeling and active forces together**

Authors: Alejandro Torres-Sánchez, Guillermo Vilanova, Marino Arroyo

Presenting Author: Alejandro Torres-Sánchez

**748 The interaction of cells with the surrounding environment, a statistical mechanics perspective**

Authors: Andrea Vigliotti, Siamak S. Shishvan, Vikram S. Deshpande

Presenting Author: Andrea Vigliotti

**1045 Dynamics of membrane-protein interactions**

Authors: Caterina Tozzi, Nikhil Walani, Marino Arroyo

Presenting Author: Caterina Tozzi

**1562 Surfactant transport during the rheological relaxation of two-dimensional dry foams**

Authors: Francesca Zaccagnino, Somon Cox

Presenting Author: Francesca Zaccagnino

Lunch 12.15-13.45 - 1st floor

Springer Lunch & Learn: Publishing Scientific Research, Nathalie Jacobs - Room Indaco

## 4-1 - Experimental Micromechanics and Nanomechanics

Morning Session

DAY: Tuesday

ROOM: Verde A

TIME 10:15-12:15

CHAIR: Sandra Korte-Kerzel, Jeffrey M. Wheeler

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|---|---|---|
| KEYNOTE | 362 | **High Temperature Performance of Metallic and Metal-Ceramic Nanoscale Multilayers**<br>Authors: Javier LLorca<br>Presenting Author: Javier LLorca |
| | 609 | **Microscale Tribology of Pearlite Steel and the Deformation of Cementite**<br>Authors: Steffen Brinckmann, Caroline Fink, Haleh Taghinejadi, Gerhard Dehm<br>Presenting Author: Steffen Brinckmann |
| | 1059 | **Enhanced strain rate sensitivity of nanotwinned Cu under high temperature indentation-creep**<br>Authors: Yang Lingwey, Miguel Monclus, Chuanyun Wang, Lei Lu, Jon Molina-Aldareguía<br>Presenting Author: Miguel Monclus |
| | 595 | **Anneal hardening and high temperature strain rate sensitivity of nanostructured metals and their relation to intergranular dislocation accommodation**<br>Authors: Verena Maier-Kiener, Daniel Kiener, Reinhard Pippan, Oliver Renk<br>Presenting Author: Oliver Renk |
| | 520 | **Hardness and elastic modulus mapping to investigate the microstructural/micromechanical relation in cBN-TiN composites**<br>Authors: Joan Josep Roa, Hossein Besharatloo, Kurt Johanns, Warren C. Oliver, Luis Llanes<br>Presenting Author: Joan Josep Roa Rovira |

Lunch 12.15-13.45 - 1st floor

Springer Lunch & Learn: Publishing Scientific Research, Nathalie Jacobs - Room Indaco

## 6-3 - Dynamic Failure and Phase Transition in Structured Media

Morning Session

DAY: Tuesday

ROOM: Verde B

TIME 10.15-12.15

CHAIR: Michael Nieves, Andrea Piccolroaz

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| KEYNOTE | 397 | **Design of Fault-Tolerant Energy Absorbing Lattices**<br>Authors: Michael Ryvkin, Andrej Cherkaev, Stephan Rudykh, Viacheslav Slesarenko<br>Presenting Author: Michael Ryvkin |
| INVITED | 256 | **The Topology and Mechanics of the Formation of Fracture Surface Patterns**<br>Authors: Itamar Kolvin, Jay Fineberg, Mokhtar Adda-Bedia<br>Presenting Author: Jay Fineberg |
| INVITED | 1042 | **Crucial role of `non-essential' multifield approximations in lattice dynamics and dynamic phase transitions**<br>Authors: Miguel Charlotte, Lev Truskinovsky<br>Presenting Author: Miguel Charlotte |
| | 1312 | **The numerical simulation of the multi-stage damage behavior of the HR2 steel thick-walled cylinder expanded by explosive load**<br>Authors: Yuxi Jiang, Songqing Jiang, Wentao Liu<br>Presenting Author: Yuxi Jiang |
| INVITED | 964 | **A bottom-up approach for brittle fracture from molecular to continuum**<br>Authors: Sandeep Patil, Yousef Heider, Bernd Markert<br>Presenting Author: Bernd Markert |

Lunch 12.15-13.45 - 1st floor

Springer Lunch & Learn: Publishing Scientific Research, Nathalie Jacobs - Room Indaco

**3-5 - Mechanics and Physics of Solids and Structures** Morning Session

DAY: Tuesday

ROOM: Italia

TIME 10.15-12.15

CHAIR: N. Triantafyllidis, M. Bacca

**1455 Thermoviscoelastoplastic modeling of soft membranes**

Authors: Federico Bosi, Sergio Pellegrino

Presenting Author: Federico Bosi

**1348 A nonlinear theory for fibre-reinforced magneto-elastic rods**

Authors: Jacopo Ciambella, Antonino Favata, Giuseppe Tomassetti

Presenting Author: Giuseppe Tomassetti

**349 Stability Analysis of a Thermodynamically Consistent Model of Atomic Step Dynamics**

Authors: Laurent Guin, Michel Jabbour, Nicolas Triantafyllidis

Presenting Author: Laurent Guin

**1420 Limit design analysis of solids susceptible to the stress state type**

Authors: Evgeny Lomakin, Boris Fedulov

Presenting Author: Evgeny Lomakin

**208 Onset of mechanical nonlinearities for amorphous polymers in their glass transition regime : experimental results and model**

Authors: Helene Montes, François Lequeux, Sabine Cantournet

Presenting Author: Helene Montes

**1106 Local yield stress statistics in model amorphous solids**

Authors: Armand Barbot, Matthias Lerbinge, Anier Hernandez-Garcia, Reinaldo Garcia-Garcia, Michael L. Falk, Damien Vandembroucq, Sylvain Patinet

Presenting Author: Sylvain Patinet

Lunch 12.15-13.45 - 1st floor

Springer Lunch & Learn: Publishing Scientific Research, Nathalie Jacobs - Room Indaco

**3-14 - Symposium honouring Prof. Fleck on the occasion of his 60th birthday**

Morning Session

DAY: Tuesday

ROOM: Europa Auditorium

TIME 10.15-12.15

CHAIR: Marc Geers, Matthew Begley

**185** **Atomistic modeling of history-independent cyclic fatigue of nanotwinned metals governed by correlated necklace dislocations**

Authors: Huajian Gao, Haofei Zhou

Presenting Author: Huajian Gao

**1355** **Lattice continuum: creep, diffusion, dislocation climb and glide**

Authors: Sinisa Dj. Mesarovic

Presenting Author: Sinisa Mesarovic

**1103** **A computational modelling study of dislocation pile-up–phase boundary interaction**

Authors: Franz Bormann, Ron Peerlings, Marc Geers

Presenting Author: Ron Peerlings

**376** **Cohesive-Length Scales and Mixed-Mode Fracture**

Authors: Michael Thouless

Presenting Author: Michael Thouless

**1171** **Creating Sandwich Core Topologies Using Fused Deposition Modeling And Electroforming Processes**

Authors: Marc Zupan, Steven Storck

Presenting Author: Marc Zupan

**513** **Controllable localized deformation in a two dimensional metamaterial**

Authors: Yafei Zhang, Changqing Chen

Presenting Author: Changqing Chen

Lunch 12.15-13.45 - 1st floor

Springer Lunch & Learn: Publishing Scientific Research, Nathalie Jacobs - Room Indaco

**3-3 - Material Instabilities** Morning Session

DAY: Tuesday

ROOM: Celeste

TIME 10.15-12.15

CHAIR: Ahmed Benallal & Henryk Petryk

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| **KEYNOTE** | **1415** | **Transformation Induced Instabilities in Pseudoelastic NiTi Structures** |
| | | Authors: Karlos Kazinakis, Stelios Kyriakides, Dongjie Jlang, Chad Landis |
| | | Presenting Author: Stelios Kyriakides |
| **INVITED** | **493** | **Phase field approach for stress-induced phase transformations that satisfies crystal lattice instability conditions** |
| | | Authors: Valery Levitas |
| | | Presenting Author: Valery Levitas |
| **INVITED** | **847** | **The roles of length and time scales in phase transition instability** |
| | | Authors: Qingping Sun, Mingpeng Li |
| | | Presenting Author: Qingping Sun |
| | **537** | **Thermal effects on dynamic magnetic-field-induced martensite reorientation of single crystal Ni-Mn-Ga** |
| | | Authors: Shaobin Zhang, Yongjun He, Ziad Moumni |
| | | Presenting Author: Shaobin Zhang |
| | **1438** | **Crushing of Open-Cell Foams with Cell-Size Distributions** |
| | | Authors: Stavros Gaitanaros, Stelios Kyriakides, Andrew Kraynik |
| | | Presenting Author: Stavros Gaitanaros |

Lunch 12.15-13.45 - 1st floor

Springer Lunch & Learn: Publishing Scientific Research, Nathalie Jacobs - Room Indaco

**1-9 - Modeling of Fracture in Hard and Sof materials** Morning Session

DAY: Tuesday

ROOM: Magenta A

TIME 10.15-12.15

CHAIR: Guido Borino, Roberta Massabò

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| **KEYNOTE** | **1354** | **Complexity in virtual tests for composite materials: large structures and the microstructural scale**<br>Authors: Jerry Quek, Brian Cox, Francesca Vadalà<br>Presenting Author: Brian Cox |
| | **837** | **The Discontinuity-Enriched Finite Element Method (DE-FEM) for Modeling 3-D Problems in Fracture Mechanics**<br>Authors: Jian Zhang, Alejandro Aragon, Fred Keulen<br>Presenting Author: Jian Zhang |
| | **827** | **A Low Order Virtual Element Formulation for Phase Field Modelling of Brittle Fracture**<br>Authors: Blaž Hudobivnik, Fadi Aldakheel, Ali Hussein, Peter Wriggers<br>Presenting Author: Blaž Hudobivnik |
| | **1026** | **Impact-induced crack patterns in brittle materials: Evidence of a power law dependence with fracture energy**<br>Authors: Jared Rivera, Jonathan Berjikian, Mathieu Bauchy, N. M. Anoop Krishnan<br>Presenting Author: N. M. Anoop Krishnan |

Lunch 12.15-13.45 - 1st floor

Springer Lunch & Learn: Publishing Scientific Research, Nathalie Jacobs - Room Indaco

## 3-7 - Nonlinear Elasticity

Morning Session

DAY: Tuesday

ROOM: Magenta B

TIME 10.15-12.15

CHAIR: Patrizio Neff, Luis Dorfman

| | | |
|---|---|---|
| KEYNOTE | 1115 | **Energy-Minimizing States of Hihgly Deformable Elastic Surfaces**<br>Authors: Timothy Healey<br>Presenting Author: Timothy Healey |
| | 203 | **Magic angles for fibrous incompressible elastic materials**<br>Authors: Jeremiah Murphy Murphy<br>Presenting Author: Jerry Murphy |
| | 252 | **Hyperelastic models with uncertain responses under multiaxial loads**<br>Authors: L. Angela Mihai, Thomas E. Woolley, Alain Goriely<br>Presenting Author: Angela Mihai |
| | 327 | **A theory of continuum dynamics on manifolds**<br>Authors: Raz Kupferman, Elihu Olami, Reuven Segev<br>Presenting Author: Reuven Segev |
| | 678 | **Polyconvexity vs. rank-one convexity for isochoric and incompressible energies in planar elasticity**<br>Authors: Robert J. Martin, Ionel-Dumitrel Ghiba, Patrizio Neff<br>Presenting Author: Robert Martin |

Lunch 12.15-13.45 - 1st floor

Springer Lunch & Learn: Publishing Scientific Research, Nathalie Jacobs - Room Indaco

**Plenary Lecture**

DAY: Tuesday

ROOM: Europa Auditorium

TIME 13.45-14.30

CHAIR Claudia Comi

**Modelling of strain localization in ductile materials**

Odd Sture Hopperstad

**7-6 - Structual Analysis of Real Historic Buildings** Afternoon Session

DAY: Tuesday

ROOM: Cobalto

TIME 14.30-16.30

CHAIR: Maurizio Angelillo, Santiago Huerta

**852** **Resistance of flat vaults with respect to their stereotomy**

Authors: Mathias Fantin, Maurizio Brocato, Thierry Ciblac

Presenting Author: Thierry Ciblac

**334** **The dome and the buttress system of San Francesco di Paola in Naples. A stability analysis.**

Authors: Concetta Cusano, Claudia Cennamo, Maurizio Angelillo

Presenting Author: Concetta Cusano

**919** **Lower-bound limit analysis of historical masonry vaults of general shape and under general loads**

Authors: Aguinaldo Fraddosio, Nicola Lepore, Mario Daniele Piccioni

Presenting Author: Nicola Lepore

**265** **A Computer Code Producing Statically Admissible Stress Fields for Masonry Vaults**

Authors: Elena De Chiara, Antonio Fortunato

Presenting Author: Elena De Chiara

**1425** **A No-Tension Model for the brick masonry vaults of San Barbaziano Church in Bologna**

Authors: Michela Monaco, Immacolata Bergamasco

Presenting Author: Michela Monaco

**383** **Load tests on the masonry vaults of Palazzo Caracciolo D'Avellino in Naples: from numerical prediction to experimental results**

Authors: Giuseppe Brandonisio, Antonello De Luca

Presenting Author: Antonello De Luca

Coffee Break 16.30-17.00 - Ground floor and 1st floor

**2-5 - Cardiovascular Biomechanics and Mechanobiology: from Basics to Clinical Applications** Afternoon Session

DAY: Tuesday

ROOM: Ciano A

TIME 14.30-16.30

CHAIR: A. Veneziani, C. Cyron

| | | |
|---|---|---|
| **KEYNOTE** | **750** | **A novel flow-tissue multiscale strategy for analysing vascular physiopathology**<br>Authors: Daniele Bianchi, Alessio Gizzi, Michele Marino, Giuseppe Vairo<br>Presenting Author: Michele Marino |
| **INVITED** | **867** | **Homogenized Constrained Mixture Approach to Predict Arterial Growth and Remodeling: A Finite Element Implementation**<br>Authors: S. Jamaleddin Mousavi, Stéphane Avril<br>Presenting Author: S. Jamaleddin Mousavi |
| | **690** | **Fluid-Structure Interaction of Woven Dacron Aortic Prostheses with Simple Interrupted Suture**<br>Authors: Eleonora Tubaldi, Michael P. Paidoussis, Marco Amabili<br>Presenting Author: Eleonora Tubaldi |
| **INVITED** | **573** | **A Chemo-mechano-biological Approach for the Computational Modelling of In-stent Restenosis**<br>Authors: Meike Gierig, Michele Marino, Peter Wriggers<br>Presenting Author: Meike Gierig |
| **INVITED** | **176** | **Three-Dimensional Riemannian Stress-Free Configuration of Arteries**<br>Authors: Keiichi Takamizawa<br>Presenting Author: Keiichi Takamizawa |

Coffee Break 16.30-17.00 - Ground floor and 1st floor

## 1-6 - Multiscale Modelling of Polycrystalline Materials

Afternoon Session

DAY: Tuesday

ROOM: Ciano B

TIME 14:30-16:30

CHAIR: Cazacu Upadhyay

**394** **Prediction of plastic anisotropy in yield stresses and Lankford coefficients of textured polycrystalline sheets using a new single crystal model**

Authors: Oana Cazacu, Nitin Chandola, Benoit Revil-Baudard

Presenting Author: Oana Cazacu

**509** **Biaxial load path change response of 316L stainless steel: multi-scale modeling and in-situ cruciform experiments**

Authors: Manas Upadhyay, Tobias Panzner, Steven van Petegem, Anirban Patra, Wei Wen, Carlos Tome, Ricardo Lebensohn, Helena van Swygenhoven

Presenting Author: Manas Upadhyay

**308** **Representative volume element size determination for viscoplastic polycrystalline materials**

Authors: Justin Dirrenberger, Shaobo Yang, Eric Monteiro, Nicolas Ranc

Presenting Author: Justin Dirrenberger

**1510** **A Microstructure-Informed Thermo-Elastic-Plastic Constitutive Model for Ferrite-Pearlite Steel: Application to Machining Process**

Authors: Jifeng Li, Ignacio Romero, Javier Segurado

Presenting Author: Jifeng Li

**1509** **Physically-based modelling of the mechanical behavior of martensitic steels. Comparison with experimental data.**

Authors: Maxime Sauzay, Pierre-François Giroux, Diogo Gonçalvès, Jia Chao Chen, Stefan Holmlström

Presenting Author: Maxime Sauzay

Coffee Break 16.30-17.00 - Ground floor and 1st floor

**5-3 - Geometry and Discretization** Afternoon Session

DAY: Tuesday

ROOM: Gialla A

TIME 14.30-16.30

CHAIR: G. Lorenzo

**1302** **A cost-effective isogeometric approach for composite structures based on a stress recovery procedure**

Authors: Alessandro Reali, John-Eric Dufour, Pablo Antolin, Alessia Patton, Giancarlo Sangalli, Josef Kiendl, Ferdinando Auricchio

Presenting Author: Alessandro Reali

**238** **Hybrid High-Order methods for finite deformations of hyperelastic materials**

Authors: Mickaël Abbas, Alexandre Ern, Nicolas Pignet

Presenting Author: Nicolas Pignet

**1506** **Adaptive simulation of plates and shells with hierarchical B-Splines**

Authors: Luca Coradello, Annalisa Buffa, Rafael Vazquez

Presenting Author: Luca Coradello

Coffee Break 16.30-17.00 - Ground floor and 1st floor

## 5-4 - Models and Numerical Methods for Coupled Problems in Mechanics

Afternoon Session

DAY: Tuesday

ROOM: Gialla B

TIME 14:30-16:30

CHAIR: I. Romero, A. Lew

| | | |
|---|---|---|
| KEYNOTE | 983 | **Numerical solution of the flexoelectric coupling based on an immersed boundary B-spline framework**<br>Authors: David Codony, Onofre Marco, Sonia Fernández-Méndez, Irene Arias<br>Presenting Author: David Codony |
| | 589 | **A coupled electrothermal model for simulating lightning strike damage in unidirectional composite laminates**<br>Authors: Nikolaos Tselentis, Konstantinos Tserpes<br>Presenting Author: Konstantinos Tserpes |
| | 1122 | **Coupled thermo-electro-mechanical problem for inelastic non-linear structures with active viscoelastic layers**<br>Authors: Igor Guz, Yaroslav Zhuk, Maria Kashtalyan<br>Presenting Author: Igor Guz |
| | 1197 | **An experimentally validated, electro-visco-hyperelastic analysis of soft dielectric elastomer materials**<br>Authors: Arpit Srivastava, Sumit Basu<br>Presenting Author: Arpit Srivastava |
| | 1194 | **High-Order Methods for Brittle Crack Propagation in 2D**<br>Authors: Adrian Lew<br>Presenting Author: Adrian Lew |

Coffee Break 16.30-17.00 - Ground floor and 1st floor

**3-8 - Recent advances in damage mechanics** Afternoon Session

DAY: Tuesday

ROOM: Bianca A

TIME 14.30-16.30

CHAIR: Claudia Comi, Umberto Perego

**765 Gradient damage models for large deformation**

Authors: Blandine Crabbé, Jean-Jacques Marigo, Eric Chamberland, Joachim Guilié

Presenting Author: Blandine Crabbé

**555 Gradient Damage Models Applied to Dynamic Fragmentation**

Authors: Arthur Geromel Fischer, Jean-Jacques Marigo

Presenting Author: Arthur Geromel Fischer

**1165 Constraint regularization for a non-smooth damage model**

Authors: Nunziante Valoroso, Claude Stolz

Presenting Author: Claude Stolz

**359 Damage and failure mechanisms in ductile metals at negative stress triaxialities**

Authors: Michael Brünig, Steffen Gerke, Marco Schmidt

Presenting Author: Michael Brünig

**1501 Revisiting Gurson-Tvergaard-Needleman model to develop a thermodynamically consistent damage model**

Authors: Eva M Andres, Javier Segurado, Ignacio Romero

Presenting Author: Eva M Andres

**944 Prediction of precipitate coarsening induced damage in welded 9Cr piping systems at high temperature**

Authors: Cathal Ó Murchú, Padraic E. O'Donoghue, Sean B. Leen, Richard A. Barrett

Presenting Author: Padraic E. O'Donoghue

Coffee Break 16.30-17.00 - Ground floor and 1st floor

**GS-9 Structural Mechanics** Afternoon Session

DAY: Tuesday

ROOM: Bianca B

TIME 14.30-16.30

CHAIR: Alberto Di Matteo, Pedro Dias Simão

**273 On lay-up chioce of anisotropic composite plates under bucking and post-buckling conditions**

Authors: Sergey Selyugin

Presenting Author: Sergey Selyugin

**556 Free vibration analysis of arbitrary graded piezoelectric beam using a modified state space differential quadrature method**

Authors: Balavishnu Udayakumar, K.V. Nagendra Gopal

Presenting Author: Balavishnu Udayakumar

**751 Free vibration response and damping behaviour of viscoelastic sandwich panels using multi-scale asymptotic expansion method**

Authors: Guruprasad Hegde, K.V. Nagendra Gopal

Presenting Author: Guruprasad Hegde

**886 Meshfree LEM approach for laminated plates of arbitrary shape**

Authors: Alberto Di Matteo, Giuseppe Battaglia, Giorgio Micale, Antonina Pirrotta

Presenting Author: Alberto Di Matteo

**997 Instability of split elastic structures**

Authors: Andrii Iakovliev, Srinandan Dasmahapatra, Atul Bhaskar

Presenting Author: Andrii Iakovliev

**248 Multi-axial Stress Sensor for Structural Health Monitoring**

Authors: Mohammad Abbasi Gavarti, Francesco Braghin, Daniele Caltabiano, Gabriele Bertagnoli, Elio Guidetti

Presenting Author: Mohammad Abbasi Gavarti

Coffee Break 16.30-17.00 - Ground floor and 1st floor

**1-4 - Mechanics of Textile Composite Reinforcements and Fibrous Materials**

Afternoon Session

DAY: Tuesday

ROOM: Europa A

TIME 14.30-16.30

CHAIR: Lomov S., Orgeas L.

**170 Numerical simulation of fiber orientation change and defect generation during preforming process of CFRP**

Authors: Masaaki Nishikawa, Naoko Takahashi, Naoki Matsuda, Masaki Hojo

Presenting Author: Masaaki Nishikawa

**367 Finite element simulation of the transverse compression of carbon tows: influence of disorder within the filament assembly**

Authors: Moustacas Hélène, Durville Damien, Wielhorski Yanneck

Presenting Author: Moustacas Hélène

**368 Mechanics of random fiber networks with inter-fiber adhesion**

Authors: Catalin Picu, Vineet Negi, Ahmed Sengab

Presenting Author: Catalin Picu

**544 Influence of Twisting Process on Mechanical Properties of Filament Yarns : Experimental and Numerical Study**

Authors: Aurélien Sibellas, Damien Durville, Eric Marie, Jérôme Adrien

Presenting Author: Aurélien Sibellas

**587 Hygro-thermo-mechanics of fibrous networks: from effective properties to scale effects.**

Authors: Emanuela Bosco, Ron Peerlings, Marc Geers

Presenting Author: Emanuela Bosco

**1200 Investigation of mechanical properties of tufted composites: influence of the tufting process parameters**

Authors: Cahn Hiu, Xavier Legrand, Peng Wang, Lingshan Liu

Presenting Author: Xavier Legrand

Coffee Break 16.30-17.00 - Ground floor and 1st floor

## 3-2 - Homogenization Strategies for Multiphase and Active Materials

Afternoon Session

DAY: Tuesday

ROOM: Europa B

TIME: 14:30-16:30

CHAIR: Kostas Danas, Nick Triantafyllidis

**989** **Shortening, lengthening and thickening of dielectric composite elastomer actuators**

Authors: Massimiliano Gei, Roberta Springhetti, Lorenzo Morini

Presenting Author: Massimiliano gei

**215** **Nonlinear Electroelastic Deformations of Soft Layered Composites Containing Space Charges, with Application to Electrets**

Authors: Victor Lefevre, Guillaume D'Hondt, Oscar Lopez-Pamies

Presenting Author: Victor Lefevre

**526** **The coupling between the chains network and the electromechanical response of the polymer**

Authors: Nir Alboteanu, Gal deBotton

Presenting Author: Nir Alboteanu

**443** **An analytical network-averaging model for eletroelasticity in dielectric elastomers**

Authors: Vu Ngoc Khiêm, Sugeng Waluyo, Mokarram Hossain, Mikhail Itskov

Presenting Author: Vu Ngoc Khiêm

**1137** **Finite Element Homogenization of Nanoporous Piezoelectric Composites with Uncoupled Surface Effects**

Authors: Andrey Nasedkin, Anna Nasedkina, Alexandr Kornievsky

Presenting Author: Anna Nasedkina

Coffee Break 16.30-17.00 - Ground floor and 1st floor

**7-3 - Mechanics of Tensegrity Structures and Multifunctional Lattice Materials**

Afternoon Session

DAY: Tuesday

ROOM: Europa C

TIME 14.30-16.30

CHAIR Fernando Fraternali, Chiara Daraio

**1372 Programmable Deployment of Tensegrity Structures by Stimulus-Responsive Polymers**

Authors: Glaucio Paulino, Ke Liu, Jiangtao Wu, Jerry Qi

Presenting Author: Glaucio Paulino

**614 On the post-buckling response of tensegrity-based metamaterials**

Authors: Julian J. Rimoli, Hossein Salahshoor, Raj Kumar Pal

Presenting Author: Julian J. Rimoli

**351 Tensegrity D-bar Systems for Energy Storage**

Authors: Raman Goyal, Edwin Peraza Hernandez, Robert Skelton

Presenting Author: Raman Goyal

**403 Effective properties of auxetic multilattice structures**

Authors: Igor Berinskii

Presenting Author: Igor Berinskii

**661 Three-dimensional lattice materials with programmable thermal expansion**

Authors: Hang Xu, Amr Farag, Damiano Pasini

Presenting Author: Hang Xu

**301 Nonlinear wave dispersion analysis in 1-D metamaterials made of tensegrity units**

Authors: Geminiano Mancusi, Luciano Feo, Agostina Orefice, Ida Mascolo, Ada Amendola, Fernando Fraternali

Presenting Author: Ida Mascolo

Coffee Break 16.30-17.00 - Ground floor and 1st floor

**1-3 - Architected Materials** Afternoon Session

DAY: Tuesday

ROOM: Indaco

TIME 14.30-16.30

CHAIR: Patrick Onck, D. Pasini

**1013 Form-finding in elastic gridshells**

Authors: Changyeob Baek, Andrew O. Sageman-Furnas, Mohammad K. Jawed, Pedro M. Reis

Presenting Author: Changyeob Baek

**927 Three-dimensional self-morphing of triangular planar lattices triggered by distributed beam expansion**

Authors: Lorenzo Guiducci, Peter Fratzl, John Dunlop

Presenting Author: Lorenzo Guiducci

**744 Selective pattern transformation via Euler buckling of hierarchical beams**

Authors: Gabriella Tarantino, Kostas Danas

Presenting Author: Gabriella Tarantino

**498 Piezoelectric polymer thin films with architected cuts**

Authors: Lichen Fang, Jing Li, Zeyu Zhu, Sung Hoon Kang

Presenting Author: Sung Hoon Kang

Coffee Break 16.30-17.00 - Ground floor and 1st floor

**5-6 - Mechanics in energy harvesting and storage** Afternoon Session

DAY: Tuesday

ROOM: Rossa A

TIME 14.30-16.30

CHAIR: Alberto Salvadori

| | | |
|---|---|---|
| | **921** | **Quantitative electrochemical strain microscopy**<br>Authors: Bernhard Roling, Stephan Bradler, Andre Schirmeisen, Valon Lushta<br>Presenting Author: Bernhard Roling |
| | **254** | **Diffusion induced super bending of bilayered Li-ion battery electrodes and application to in-situ measurement of elastic properties**<br>Authors: Junqian Zhang, Dawei Li<br>Presenting Author: Junqian Zhang |
| **KEYNOTE** | **1360** | **Mechanical Degradation and Optimization of Solid Electrolyte Interphases in Li Ion Batteries**<br>Authors: Brian W. Sheldon, Ravi Kumar, Wei Zhang, Jung Hwi Cho<br>Presenting Author: Brian W. Sheldon |
| | **511** | **Mechanical and structural degradation of LiNixMnyCozO2 cathode in Li-ion batteries**<br>Authors: Kejie Zhao<br>Presenting Author: Kejie Zhao |
| | **551** | **A micromechanical model for the lithiation of active particles in Li-ion battery electrodes**<br>Authors: Marco Magri, Alberto Salvadori<br>Presenting Author: Marco Magri |

Coffee Break 16.30-17.00 - Ground floor and 1st floor

## 2-2 - Mechanics and Shape Control of Biological Membranes and Thin Structures

Afternoon Session

DAY: Tuesday

ROOM: Rossa B

TIME 14.30-16.30

CHAIR: DeSimone, Arroyo, Noselli

**477** **Baromorphs - Dynamically controlled bio-inspired shape-morphing**

Authors: Emmanuel Siéfert, José Bico, Etienne Reyssat, Benoit Roman

Presenting Author: Emmanuel Siéfert

**757** **Computational design of non-Euclidean gel plates**

Authors: Alessandro Lucantonio, Antonio DeSimone

Presenting Author: Alessandro Lucantonio

**775** **Friction-Restricted Growth and Buckling of Elastic Fibers**

Authors: Peter L. Varkonyi, Marcell G. Horvath, Andras A. Sipos

Presenting Author: Peter L. Varkonyi

**1543** **A new concept of tissue engineering scaffold, based on Shellular**

Authors: Jiafei Gu, Shiyi Tan, Kiju Kang

Presenting Author: Jiafei Gu

**1255** **A simple analytical model for estimating the role of synovial fluid in articular joints**

Authors: Gennaro Vitucci, Gennady Mishuris

Presenting Author: Gennaro Vitucci

**299** **Scale- and surface chemistry dependent mechanical properties of mucus layers as studied with atomic force microscopy**

Authors: Seunghwan Lee, Nikolaos Nikogeorgos

Presenting Author: Seunghwan Lee

Coffee Break 16.30-17.00 - Ground floor and 1st floor

**4-1 - Experimental Micromechanics and Nanomechanics** Afternoon Session

DAY: Tuesday

ROOM: Verde A

TIME 14:30-16:30

CHAIR: Javier Llorca, Christoph Kirchlechner

**1101** **Plasticity in complex crystals – On the role of building blocks in intermetallics and layered compounds**

Authors: Sandra Korte-Kerzel, Sebastian Schröders, Stefanie Sandlöbes, James Gibson, Robert Thompson, Philip Howie, William Clegg

Presenting Author: Sandra Korte-Kerzel

**472** **Size Effect in Nickel-Cobalt Alloys**

Authors: Yuan Xian, Bin Gan, Jeffrey M. Wheeler

Presenting Author: Jeffrey M. Wheeler

**348** **In-situ TEM study on deformation behaviors of CrMnFeCoNi single crystal high entropy alloys**

Authors: Subin Lee, Christian Liebscher, Gerhard Dehm

Presenting Author: Subin Lee

**1108** **Nanoindentation and micropillar compression tests: study of the mechanical hysteresis of the MAX phase Ti2AlN**

Authors: Christophe Tromas, Wilgens Sylvain, Anne Joulain, Ludovic Thilly, Patrick Villechaise, Marc Legros

Presenting Author: Christophe Tromas

**527** **Effect of the microstructure in the plasticity of sub-micron Al and Be wires**

Authors: Frédéric Mompiou, Marc Legros

Presenting Author: Frédéric Mompiou

**785** **Characterization of the anisotropy of the duplex stainless steels by means of the micromechanical evaluation**

Authors: Hossein Besharatloo, Joan Josep Roa, Gemma Fargas, Antonio Manuel Mateo, Luis Miguel llanes

Presenting Author: Hossein Besharatloo

Coffee Break 16.30-17.00 - Ground floor and 1st floor

## 6-3 - Dynamic Failure and Phase Transition in Structured Media

Afternoon Session

DAY: Tuesday

ROOM: Verde B

TIME 14:30-16:30

CHAIR: Gennady Mishuris, Bernd Markert

| | | |
|---|---|---|
| **INVITED** | **389** | **Crack propagation in dissimilar discrete structures** |
| | | Authors: Nikolai Gorbushin, Gennady Mishuris |
| | | Presenting Author: Nikolai Gorbushin |
| **INVITED** | **1076** | **Some Wiener-Hopf problems related to fault propagation in elastic structures** |
| | | Authors: Pavlos Livasov, Gennady Mishuris |
| | | Presenting Author: Pavlos Livasov |
| **INVITED** | **1380** | **Crack dynamics in a bimaterial lattice** |
| | | Authors: Andrea Piccolroaz, Nikolai Gorbushin, Gennady Mishuris |
| | | Presenting Author: Andrea Piccolroaz |
| **INVITED** | **1052** | **Analytical and numerical studies of failure in 1D flexural systems** |
| | | Authors: Marta Garau, Ian Jones, Gennady Mishuris, Michael Nieves |
| | | Presenting Author: Marta Garau |
| **INVITED** | **392** | **Transition waves in flexural systems with rotational inertia** |
| | | Authors: Michael Nieves, Marta Garau, Michele Brun |
| | | Presenting Author: Michael Nieves |

Coffee Break 16.30-17.00 - Ground floor and 1st floor

**3-5 - Mechanics and Physics of Solids and Structures** Afternoon Session

DAY: Tuesday

ROOM: Italia

TIME 14.30-16.30

CHAIR: B. Davidovitch, S. Rubinstein

**1037 Forceless Sadowsky strips are spherical**

Authors: Gert van der Heijden, Eugene Starostin

Presenting Author: Gert van der Heijden

**1448 Shape of an heavy ribbon held curved at one extremity**

Authors: Gwenn Boedec, Julien Deschamps

Presenting Author: Gwenn Boedec

**1303 Stability of a magnetic ring subject to a point dipole**

Authors: Tuan Hoang, Eliot Fried

Presenting Author: Tuan Hoang

**1298 Bistable mechanisms for strips with controlled clamped ends**

Authors: Alessandro Cazzolli, Francesco Dal Corso, Davide Bigoni

Presenting Author: Alessandro Cazzolli

**1295 The dynamics of structures with configurational forces**

Authors: Francesco Dal Corso, Costanza Armanini, Diego Misseroni, Davide Bigoni

Presenting Author: Francesco Dal Corso

**747 Open Trefoil Knots with no self-contact**

Authors: Sebastien Neukirch, Paul Grandgeorge, Derek Moulton

Presenting Author: Sebastien Neukirch

Coffee Break 16.30-17.00 - Ground floor and 1st floor

## 3-14 - Symposium honouring Prof. Fleck on the occasion of his 60th birthday

Afternoon Session

DAY: Tuesday

ROOM: Europa Auditorium

TIME 14.30-16.30

CHAIR: Nicolas TRIANTAFYLLIDIS, Ron Peerlings

**478** **Acoustic metafoams: enabling multi-functional sound attenuation**

Authors: Marc Geers, Miroslawa Lewinska, Kamil Chrzaszcz, Varvara Kouznetsova, Johan Hoefnagels, Albert Poortinga

Presenting Author: Marc Geers

**1167** **High-contrast periodic lattices: bandgaps and spatial filtering**

Authors: Valery Smyshlyaev

Presenting Author: Valery Smyshlyaev

**706** **Vibroacoustic wave transport phenomena in periodic materials**

Authors: Srikantha Phani

Presenting Author: Srikantha Phani

**440** **MULTISCALE MODELING OF SOUND ABSORPTION IN DOUBLE-POROSITY MATERIALS**

Authors: X. W. Ma, X. W. Liu, S. W. Ren, F. X. Xin, Tian Jian Lu

Presenting Author: Tian Jian Lu

**716** **Theoretical Analysis of Metal Tubes under Expansion**

Authors: Yuzhe Liu, Xinming Qiu, T.X Yu

Presenting Author: Xinming Qiu

**1577** **Multiscale topology optimization for stiffness and strength**

Authors: Jeroen Groen, Christian Rye Thomsen, Fengwen Wang, Niels Aage, Ole Sigmund

Presenting Author: Ole Sigmund

Coffee Break 16.30-17.00 - Ground floor and 1st floor

**3-3 - Material Instabilities** Afternoon Session

DAY: Tuesday

ROOM: Celeste

TIME 14.30-16.30

CHAIR: Henryk Petryk & Ahmed Benallal

| | | |
|---|---|---|
| **INVITED** | **727** | **On the connections between imperfection and bifurcation analyses in simulation of ductile failure**<br>Authors: David Morin, Odd Sture Hopperstad, Ahmed Benallal<br>Presenting Author: David Morin |
| | **1290** | **The dynamics of a shear band**<br>Authors: Diana Giarola, Domenico Capuani, Davide Bigoni<br>Presenting Author: Diana Giarola |
| | **1310** | **Description of dynamic shear localization and failure in viscoplastic structures**<br>Authors: Hannah Lois Dorothy, Patrice Longere, Andre Dragon<br>Presenting Author: Hannah Lois Dorothy |
| **INVITED** | **1434** | **Finite element simulation of Luders bands in polycrystalline aggregates**<br>Authors: Matthieu Maziere<br>Presenting Author: Matthieu Maziere |
| | **994** | **Observation and modeling of Portevin-Le Chatelier instabilities in a cobalt-based superalloy**<br>Authors: Edi Fernandes Pereira, Vincent Marcadon, David Lévêque, Pascale Kanoute, Lionel Marcin, Florent Coudon, Samuel Forest<br>Presenting Author: Edi Fernandes Pereira |

Coffee Break 16.30-17.00 - Ground floor and 1st floor

## 6-1 -Nonlinear Dynamics in Mechanical and Structural Systems

Afternoon Session

DAY: Tuesday

ROOM: Magenta A

TIME 14.30-16.30

CHAIR: Jon Juel Thomsen, Olivier Thomas

| | | |
|---|---|---|
| KEYNOTE | 380 | **Structural transformations under dynamic loading**<br>Authors: Dmitry Indeitsev, Dmitry Skubov, Dmitry Vavilov<br>Presenting Author: Dmitry Vavilov |
| | 492 | **On the stochastic resonance phenomenon in parametrically excited mechanical systems**<br>Authors: Iliya Blekhman, Vladislav Sorokin<br>Presenting Author: Vladislav Sorokin |
| | 463 | **On the effect of longitudinal vibrations on systems with dry friction**<br>Authors: Simon Kapelke, Wolfgang Seemann<br>Presenting Author: Wolfgang Seemann |
| | 568 | **Stability loss of Axially Moving Strings and Beams**<br>Author: Alois Steindl<br>Presenting Author: Alois Steindl |
| | 774 | **Roughness-generated vertical dynamic excitation of sliding rough surfaces: experimental, numerical and analytical approaches**<br>Authors: Nicolas Ponthus, Joël Perret-Liaudet, Julien Scheibert, Anders Malthe-Sorenssen, KjetilThogersen<br>Presenting Author: Nicolas Ponthus |

Coffee Break 16.30-17.00 - Ground floor and 1st floor

**3-7 - Nonlinear Elasticity** Afternoon Session

DAY: Tuesday

ROOM: Magenta B

TIME 14.30-16.30

CHAIR: Patrizio Neff, Reuven Segev

**413 Deformations of a hyperelastic helical spring**

Authors: Les Sudak, Taisiya Sigaeva, Alexey M. Kolesnikov

Presenting Author: Les Sudak

**497 An experimental study of localized bulging in pressurized cylindrical tubes guided by newly emerged theoretical results**

Authors: Shibin Wang, Zhiming Guo, Lei Zhou, Linan Li, Yibin Fu

Presenting Author: Yibin Fu

**586 The nonlinear elasticity of hyperelastic models for stretch-dominated structures**

Authors: Alexander Safar, L. Angela Mihai

Presenting Author: Alexander Safar

**733 Finitely deforming thin-wall composite spheres**

Authors: Gidon Weil, Gal deBotton

Presenting Author: Gidon Weil

**1049 Elastic shear wave propagation in finitely deformed compressible hyperelastic layered composite**

Authors: Jian Li, Stephan Rudykh

Presenting Author: Jian LI

**1268 On the compressibility of rubber: experiments and theoretical considerations**

Authors: Robert Plachy, Stefan Scheiner, Krzysztof W. Luczynski, Armin Holzner, Christian Hellmich

Presenting Author: Robert Plachy

Coffee Break 16.30-17.00 - Ground floor and 1st floor

**7-6 - Structual Analysis of Real Historic Buildings** Evening Session

DAY: Tuesday

ROOM: Cobalto

TIME 17.00-19.00

CHAIR: Maurizio Angelillo, Santiago Huerta

**250** **Limit Analysis of cloister vaults: the case study of Palazzo Caracciolo di Avellino**

Authors: Maurizio Angelillo, Giuseppe Brandonisio, Elena De Chiara, Antonello De Luca

Presenting Author: Maurizio Angelillo

**442** **Geometry and statics: Borromini's design for the dome of Sant'Agnese in Agone, Rome**

Authors: Elena De Chiara

Presenting Author: Elena De Chiara

**1048** **An innovative ambient identification method for use on real historic buildings**

Authors: Cristiano Bilello, Chiara Masnata, Antonina Pirrotta

Presenting Author: Antonina Pirrotta

**2-5 - Cardiovascular Biomechanics and Mechanobiology: from Basics to Clinical Applications** Evening Session

DAY: Tuesday

ROOM: Ciano A

TIME 17.00-19.00

CHAIR: C. Cyron, A. Veneziani

| | | |
|---|---|---|
| **INVITED** | **1186** | **When the "Boundary" is Critical: Defective/Missing Data for Computational Hemodynamics**<br>Authors: Alessandro Veneziani<br>Presenting Author: Alessandro Veneziani |
| **INVITED** | **1004** | **Spatially resolved distensibility of healthy and diseased aortic walls determined from temporally resolved 3D ultrasound measurements**<br>Authors: Andreas Wittek, Wojciech Derwich, Thomas Schmitz-Rixen, Christopher Blase<br>Presenting Author: Andreas Wittek |
| **INVITED** | **795** | **Can the in-vivo aortic strain field explain the initiation of dissecting abdominal aneurysms in mice?**<br>Authors: Lydia Aslanidou, Mauro Ferraro, Bram Trachet, Patrick Segers, Nikos Stergiopulos<br>Presenting Author: Bram Trachet |
| | **1164** | **Biomechanical factors influencing aortic intra-mural dissection.**<br>Authors: Brian FitzGibbon, Niamh Hynes, Sherif Sultan, Peter McHugh, Patrick McGarry<br>Presenting Author: Brian FitzGibbon |
| **INVITED** | **934** | **In-vitro study of cannula flow in the ECMO circuit**<br>Authors: Julien Lemètayer, Matthias Kollert, Laszlo Fuchs, Mikael Broman, Lisa Prahl Wittberg<br>Presenting Author: Lisa Prahl Wittberg |
| **INVITED** | **844** | **Novel strategies for patient-specific modelling of arteriovenous fistula for hemodialysis**<br>Authors: Michela Bozzetto, Paolo Brambilla, Stefano Rota, Bogdan Ene-Iordache, Andrea Remuzzi<br>Presenting Author: Michela Bozzetto |

## 1-9 - Modeling of Fracture in Hard and Sof materials

Evening Session

DAY: Tuesday

ROOM: Ciano B

TIME 17.00-19.00

CHAIR: Roberta Massabò, Konstantin Volokh

**1188** **Damage in elastomers: Nucleation, growth and healing of cavities, and micro-cracks**

Authors: Ravi-Chandar Krishnaswamy

Presenting Author: Ravi-Chandran Krishnaswarny

**1284** **A 3D cohesive interface for the delamination analysis of a stiff film on a soft elastic substrate and the wrinkling/buckling deformation modes**

Authors: Guido Borino, Francesco Parrinello

Presenting Author: Guido Borino

**242** **Fracture as material sink**

Authors: Konstantin Volokh

Presenting Author: Konstantin Volokh

**332** **Effect of Solvent Diffusion on the Crack Velocity in a Reversible Hydrogel**

Authors: Olivier Ronsin, Imen Naassaoui, Tristan Baumberger

Presenting Author: Tristan Baumberger

**652** **Supershear Propagation of Frictional Rupture Fronts**

Authors: David Kammer

Presenting Author: David Kammer

**GS-4 Structural Mechanics** Evening Session

DAY: Tuesday

ROOM: Bianca B

TIME 17.00-19.00

CHAIR: Luca Taglialegne

**999 Post-buckling analysis of beam-type structural systems under tensile axial loads**

Authors: Pedro Dias Simão, Vítor Dias da Silva

Presenting Author: Pedro Dias Simão

**1339 Analytical evaluation of the stress fields in tapered box girders**

Authors: Stefano Bennati, Laura De Lorenzis, Luca Taglialegne, Paolo S. Valvo

Presenting Author: Luca Taglialegne

**1447 The flexural mechanics of thin creased strips**

Authors: Martin Walker

Presenting Author: Martin Walker

**1222 Hysteretic dissipation in carbon nanotube nanocomposites**

Authors: Giovanni Formica, Michela Talò, Biagio Carboni, Giulia Lanzara, Walter Lacarbonara

Presenting Author: Giovanni Formica

## 5-4 - Models and Numerical Methods for Coupled Problems in Mechanics

Evening Session

DAY: Tuesday

ROOM: Gialla B

TIME 17:00-19:00

CHAIR: A. Lew, I. Romero

**1456 Monolithic approach to the coupling of the contact between rough surfaces with the interfacial fluid flow**

Authors: Andrei G. Shvarts, Vladislav A. Yastrebov

Presenting Author: Andrei G. Shvarts

**1404 Impact of interfacial irregularity on polarised shear wave in an electro-elastic stratum over a substrate**

Authors: Abhishek Kumar Singh, Santan Kumar, Amares Chattopadhyay

Presenting Author: Abhishek Kumar Singh

**746 Inverse Formulation of Thermoelastic Problems in Engineering Applications**

Authors: Florian Zwicke, Stefanie Elgeti

Presenting Author: Florian Zwicke

**1062 Novel variational updates for strongly coupled thermomechanical problems including mass transport**

Authors: Eva M. Andrés, Ángel Ortiz-Toranzo, Ignacio Romero

Presenting Author: Ignacio Romero

**1480 Equivalent Static Wind Loads: similarities between envelope reconstruction and linear classification problems**

Authors: Luca Patruno, Mattia Ricci, Stefano de Miranda, Francesco Ubertini

Presenting Author: Luca Patruno

**1492 Numerical and Experimental Approaches to Soft Matter Dry and Lubricated Contact Mechanics**

Authors: Carmine Putignano, Giuseppe Carbone

Presenting Author: Carmine Putignano

**3-8 - Recent advances in damage mechanics** Evening Session

DAY: Tuesday

ROOM: Bianca A

TIME 17.00-19.00

CHAIR: Jean-Jacques Marigo, Flaviana Iurlano

**361 A stress-state-dependent anisotropic continuum damage model for concrete**

Authors: Alexander Michalski, Michael Brünig

Presenting Author: Alexander Michalski

**1314 Rate-dependent regularization for material softening**

Authors: Kai Langenfeld, Philipp Junker, Jörn Mosler

Presenting Author: Kai Langenfeld

**1498 Viscoelastic damage model for shales sheared at different strain rates**

Authors: Marte Gutierrez, Zhankun Hou, Chunhe Yang, Abdulhadi Almrabat

Presenting Author: Marte Gutierrez

**1237 Modelling of Damaged Laminated and Sandwich Shell Structures by means of Higher-order Shear Deformation Theories**

Authors: Francesco Tornabene, Nicholas Fantuzzi, Michele Bacciocchi

Presenting Author: Michele Bacciocchi

**894 Ductile to brittle failure transition under bending deformation of martensitic stainless steels**

Authors: Alvise Miotti Bettanini, Colin Laville, Jean-Denis Mithieux, Coralie Parrens, Pascal Jacques, Thomas Pardoen, Laurent Delannay

Presenting Author: Alvise Miotti Bettanini

**1046 Micromechanics-based non-local damage theory: Application to the prediction of localization and precursor statistics**

Authors: Estelle Berthier, Vincent Démery, Laurent Ponson

Presenting Author: Laurent Ponson

**GS-9 Structural Mechanics** Evening Session

DAY: Tuesday

ROOM: Bianca B

TIME 17.00-19.00

CHAIR: Luca Taglialegne

**999 Post-buckling analysis of beam-type structural systems under tensile axial loads**

Authors: Pedro Dias Simão, Vítor Dias da Silva

Presenting Author: Pedro Dias Simão

**1339 Analytical evaluation of the stress fields in tapered box girders**

Authors: Stefano Bennati, Laura De Lorenzis, Luca Taglialegne, Paolo S. Valvo

Presenting Author: Luca Taglialegne

**1447 The flexural mechanics of thin creased strips**

Authors: Martin Walker

Presenting Author: Martin Walker

**1222 Hysteretic dissipation in carbon nanotube nanocomposites**

Authors: Giovanni Formica, Michela Talò, Biagio Carboni, Giulia Lanzara, Walter Lacarbonara

Presenting Author: Giovanni Formica

**1-4 - Mechanics of Textile Composite Reinforcements and Fibrous Materials**

Evening Session

DAY: Tuesday

ROOM: Europa A

TIME 17.00-19.00

CHAIR: Boisse P., Lomov S.

**653** **Longitudinal compression and Poisson ratio of fiber yarns in meso FE modeling of textile composite reinforcements**

Authors: Dawei Wang, Naim Naouar, Emmanuelle Vidal-Salle, Philippe Boisse

Presenting Author: Philippe Boisse

**815** **Meso-scale modelling of tetraxial textiles mechanical behaviour**

Authors: Mehdi Ghazimoradi, Naim Naouar, Valter Carvelli, Philippe Boisse

Presenting Author: Valter Carvelli

**828** **MICRO SCALE MODEL OF FIBERS IN A TEMPERATURE DEPENDENT MATRIX**

Authors: Stefan Hesseler, Scott Stapleton, Lars Appel, Thomas Gries

Presenting Author: Stefan Hesseler

**907** **A behaviour model of textile structures: development, identification, and implementation**

Authors: Oussama Haji, Audrey Hivet, Laurent Orgeas, Artan Sinoimeri, Gilles Hivet, Eric Blond

Presenting Author: Oussama Haji

**941** **Microstructure of textiles quantified based on micro-CT image**

Authors: Ilya Straumit, Martine Wevers, Stepan Lomov

Presenting Author: Stepan Lomov

## 1-10 - Graphene and Related Materials and Systems

Evening Session

DAY: Tuesday

ROOM: Europa B

TIME 17.00-.19.00

CHAIR: Costas Galiotis, Massimiliano Fraldi, Federico Bosia

**1473** **Investigation of fracture behavior of graphene using in-situ tensile test under scanning electron microscope**

Authors: Bongkyun Jang, Byungwoon Kim, Jae-Hyun Kim, Hak-Joo Lee, Takashi Sumigawa, Takayuki Kitamura

Presenting Author: Bongkyun Jang

**234** **Influence of liquid substrates on the mechanics of single-layer graphene**

Authors: Hervé Elettro, Francisco Melo

Presenting Author: Hervé Elettro

**441** **An anisotropic hyperelastic material model for graphene-based structures**

Authors: Reza Ghaffari, Thang Xuan Duong, Roger A. Sauer

Presenting Author: Reza Ghaffari

**850** **Coarse-grain simulation of single-layer molybdenum disulfide elastic properties**

Authors: Artem Panchenko, Ekaterina Podolskaya, Igor Berinskii

Presenting Author: Artem Panchenko

**865** **Characterization of Graphene via Atomistic Reduced Order Modelling**

Authors: Banafsheh Sajadi, Sander Wahls, Farbod Alijani

Presenting Author: Banafsheh Sajadi

**1152** **Lubricating properties of graphene**

Authors: M. Clelia Righi, Paolo Restuccia

Presenting Author: Paolo Restuccia

## 7-3 - Mechanics of Tensegrity Structures and Multifunctional Lattice Materials

Evening Session

DAY: Tuesday

ROOM: Europa C

TIME 17.00-19.00

CHAIR: Fernando Fraternali, Ada Amendola

| | | |
|---|---|---|
| KEYNOTE | 1522 | **Bionicomposites**<br>Author: Nicola M. Pugno<br>Presenting Author: Nicola M. Pugno |
| | 1373 | **Tensegrity Topology Optimization on Arbitrary Ground Structures**<br>Authors: Ke Liu, Glaucio H. Paulino<br>Presenting Author: Ke Liu |
| | 849 | **Parametric design of V-Expander tensegrity chains**<br>Authors: Aguinaldo Fraddosio, Gaetano Pavone, Mario Daniele Piccioni<br>Presenting Author: Gaetano Pavone |
| | 194 | **A tensegrity approach to the mechanics of masonry vaults**<br>Authors: Valentino Paolo Berardi, Mariella De Piano, Rosa Penna, Luciano Feo<br>Presenting Author: Mariella De Piano |
| | 183 | **Novel lattices metamaterials with extremal response**<br>Authors: Zbigniew Bieniek, Ida Mascolo, Ada Amendola, Mariella De Piano, Chiara Daraio, Fernando Fraternali<br>Presenting Author: Zbigniew Bieniek |

**1-3 - Architected Materials** Evening Session

DAY: Tuesday

ROOM: Indaco

TIME 17.00-19.00

CHAIR: Kang, Zavattieri

**448** **Additively manufactured cellular metals with full phononic band gap**

Authors: Maximilian Wormser, Carolin Körner

Presenting Author: Maximilian Wormser

**920** **Conformation of an elastic loop structure connected with multiple revolute hinges and its measurement**

Authors: Hiro Tanaka, Takamasa Nanjo, Yoji Shibutani

Presenting Author: Hiro Tanaka

**753** **The shape memory effect in polymeric lattices**

Authors: Andrea Vigliotti, Angela Ferrigno

Presenting Author: Andrea Vigliotti

**1307** **Reduced stiffness of the axisymmetric motion in cylindrical origami metamaterials**

Authors: Giuseppe Radaelli, Just Herder, Farbod Alijani

Presenting Author: Giuseppe Radaelli

**793** **Failure of elastic-brittle and visco-plastic lattice materials**

Authors: Philipp Seiler, Vikram Deshpande, Norman Fleck

Presenting Author: Philipp Seiler

**571** **Metallic lattice structures manufactured by laser metal deposition.**

Authors: Yanis Balit, Eric Charkaluk, Andrei Constantinescu

Presenting Author: Yanis Balit

**5-6 - Mechanics in energy harvesting and storage** Evening Session

DAY: Tuesday

ROOM: Rossa A

TIME 17.00-19.00

CHAIR: Angelo Simone

**650 The Local Role of Oxygen in Unsafe Energy Storage using LiMO2 based Batteries**

Authors: Faisal Alamgir, Dong-Chan Lee

Presenting Author: Faisal M. Alamgir

**811 Fracture mechanism of lithiated silicon using atomistic simulations**

Authors: Seyed Mostafa Khosrownejad, William Curtin

Presenting Author: Seyed Mostafa Khosrownejad

**1176 Multi-Scale Modeling for Design of Lithium-ion Battery Components**

Authors: Elham Sahraei, Emanuela Bosco

Presenting Author: Elham Sahraei

**626 A computational homogenization approach for (Li-ion) battery cells**

Authors: Alberto Salvadori, Marco Magri, Tanmay Dev, Buket Boz

Presenting Author: Alberto Salvadori

**1252 Electrochemical properties of fiber-based electrodes for structural battery applications**

Authors: Mingzhao Zhuo, Davide Grazioli, Angelo Simone

Presenting Author: Mingzhao Zhuo

**1185 Piezoelectrochemical Phenomena for Low Frequency Energy Harvesting**

Authors: Craig Arnold

Presenting Author: Craig Arnold

## 9-4 - Modeling of Additive Manufacturing Processes

Evening Session

DAY: Tuesday

ROOM: Rossa B

TIME 17.00-19.00

CHAIR: F. Auricchio, E. Salsi

**1444** **Numerical model for thermal analysis of the Laser Beam Melting process**

Authors: Arnaud Francois

Presenting Author: Arnaud Francois

**720** **Phase field simulations of Powder Bed-based Additive Manufacturing**

Authors: Liangxing Lu, Yong Wei Zhang, Sridhar Narayanaswamy

Presenting Author: Sridhar Narayanaswamy

**1286** **Process Simulation and Virtual Testing of Additively Manufactured Grid Structures**

Authors: Gebhardt Ulrike, Kästner Markus, Blobel Swen, Berner Matthias, Gärtner Roland, Kühn Uta

Presenting Author: Ulrike Gebhardt

**977** **Macroscopic simulation of selective beam melting processes by means of adaptivity and domain decomposition**

Authors: Dominic Soldner, Paul Steinmann, Julia Mergheim

Presenting Author: Dominic Soldner

**1240** **Distributed-Memory Computations and Their Application to the Simulation of the Additive Manufacturing Processes**

Authors: Serge Sidorov, Pan Michaleris, Erik Denlinger, Michael Gouge, Jeff Irwin

Presenting Author: Serge Sidorov

**754** **Thermal simulation of Additive Manufacturing Processes using immersed multi-level isogeometric analysis**

Authors: Massimo Carraturo, Stefan Kollmannsberger, Ernst Rank, Ferdinando Auricchio, Alessandro Reali

Presenting Author: Massimo Carraturo

**4-1 - Experimental Micromechanics and Nanomechanics** Evening Session

DAY: Tuesday

ROOM: Verde A

TIME 17:00-19:00

CHAIR: Christophe Tromas, Miguel Monclús

| | | |
|---|---|---|
| KEYNOTE | 1552 | **In situ manipulation and testing of dislocations in 2D materials**<br>Authors: Erdmann, Peter Schweizer, Christian Dolle<br>Presenting Author: Erdmann Spiecker |
| | 814 | **Nondestructive 3D information on dislocation density and elastic strain in deforming micro-fatigue specimen**<br>Authors: Jean-Baptiste Molin, Loic Renversade, Nataliya V. Malyar Malyar, Olivier Ulrich, Jean-Sebastien Micha, Christoph Kirchlechner<br>Presenting Author: Christoph Kirchlechner |
| | 763 | **Investigating the Local Fatigue Properties of Materials in Small Dimensions by Dynamic Micropillar Compression**<br>Authors: Benoit Merle<br>Presenting Author: Benoit Merle |
| | 923 | **In-situ micromechanical study of crack nucleation and propagation in Ni-based superalloys**<br>Authors: Marcos Jiménez, Jon Molina-Aldareguia<br>Presenting Author: Jon Molina-Aldareguia |
| | 602 | **Pathways for reliable lead-free solder joints: micro-fracture properties of Au-Sn based solder**<br>Authors: Chaowei Du, Rafael Soler, Kurt Matoy, Johannes Zechner, Gregor Langer, Christoph Kirchlechner, Gerhard Dehm<br>Presenting Author: Chaowei Du |
| | 181 | **In Situ Stable Fracture of Ceramic and Metal Ceramic Interfaces on the Micron Scale**<br>Authors: Giorgio Sernicola, Ben Britton, Finn Giuliani<br>Presenting Author: Finn Giuliani |

## 8-3 - Inelastic Processes in Heterogeneous Materials: Formulations, Uncertainty Quantification, Computations

Evening Session

DAY: Tuesday

ROOM: Verde B

TIME 17.00 - 19.00

CHAIR: Matthies, Moshagen

| | | |
|---|---|---|
| KEYNOTE | 1516 | **Stochastic approach to heterogeneous dynamic systems**<br>Authors: Adnan Ibrahimbegovic, Joseph Rocca, Nikolaos Limnios<br>Presenting Author: Adnan Ibrahimbegovic |
| | 777 | **Multi-Scale Material Models via Probabilistic Coupling**<br>Authors: Hermann Matthies<br>Presenting Author: Hermann G. Matthies |
| | 918 | **Scale Switching Computations for Heterogeneous Inelastic Materials**<br>Authors: Thilo Moshagen, Herrmann Matthies, Adnan Ibrahimbegovic<br>Presenting Author: Thilo Moshagen |
| | 291 | **Spectral Representation for Solutions of Maxwell's Equations in a Two-Constituent Composite Medium**<br>Authors: David J. Bergman, Asaf Farhi<br>Presenting Author: David J. Bergman |
| | 1416 | **Statistical simulation of ply cracking in general and thin-ply laminates under in-plane and bending loads: A variational approach**<br>Authors: Mohammad Hajikazemi, Wim Van Paepegem<br>Presenting Author: Mohammad Hajikazemi |

**3-5 - Mechanics and Physics of Solids and Structures** Evening Session

DAY: Tuesday

ROOM: Italia

TIME 17.00-19.00

CHAIR: P. Reis, P.-T. Brun

**481 Gauss-Euler elastica**

Authors: Benny Davidovitch, Yiwei Sun, Gregory M. Grason

Presenting Author: Benny Davidovitch

**559 Spontaneous spiraling of an elastic sheet under uniaxial compression with confinement and friction**

Authors: Stéphanie Deboeuf, Suzie Protière, Eytan Katzav

Presenting Author: Stéphanie Deboeuf

**425 Inverse design of a suspended Kirchhoff rod: From theory to practice**

Authors: Victor Romero, Florence Bertails-Descoubes, Alexandre Derouet-Jourdan, Arnaud Lazarus

Presenting Author: Victor Romero

**373 The Interaction of Two D-Cones Along a Stretching Ridge**

Authors: Andrew B. Croll, Sean Gunderson

Presenting Author: Andrew B. Croll

**503 Deformation of perforated elastic sheets due to the hydrodynamic loading by a viscous fluid**

Authors: Matteo Pezzulla, Elizabeth Strong, Hussain Karimi, Pedro Reis

Presenting Author: Matteo Pezzulla

**684 Anomalous dynamics of snap-through instabilities**

Authors: Michael Gomez, Derek E. Moulton, Dominic Vella

Presenting Author: Michael Gomez

## 3-14 - Symposium honouring Prof. Fleck on the occasion of his 60th birthday

Evening Session

DAY: Tuesday

ROOM: Europa Auditorium

TIME 17.00-19.00

CHAIR: Huajian Gao, Vikram Deshpande

**1340** **Slip surfaces, tensile buckling, and shear bands**

Authors: Davide Bigoni

Presenting Author: Davide Bigoni

**892** **Multiscale homogenization models and predictions for porous viscoplastic polycrystals incorporating microstructure evolution**

Authors: Dawei Song, Pedro Ponte Castañeda

Presenting Author: Pedro Ponte Castañeda

**809** **On size dependent yield surfaces for porous metals**

Authors: Christian F. Niordson, Viggo Tvergaard

Presenting Author: Christian F. Niordson

**439** **Microstructured magnetorheological elastomers: numerical modelling, experiments and tailored instabilities**

Authors: Kostas Danas

Presenting Author: Kostas Danas

**673** **Scale-free intermittency in transformational plasticity**

Authors: Lev Truskinovsky

Presenting Author: Lev Truskinovsky

**1184** **The Generation of Stress and Fracture in the Storage Particles of Lithium-Ion Batteries**

Authors: Robert McMeeking

Presenting Author: Robert McMeeking

**3-3 - Material Instabilities** Evening Session

DAY: Tuesday

ROOM: Celeste

TIME 17.00-19.00

CHAIR: Henryk Petryk & Ahmed Benallal

| | | |
|---|---|---|
| INVITED | 1143 | **Post-bifurcation analysis of 3D and continuous 2D lattices structures**<br>Authors: Christelle Combescure, Ryan S. Elliott, Nick Triantafyllidis<br>Presenting Author: Christelle Combescure |
| | 494 | **Divergence stability and the Second Order Work criterion**<br>Authors: Jean Lerbet, François Nicot, Noël Challamel, Félix Darve<br>Presenting Author: Jean Lerbet |
| INVITED | 1172 | **Subcritical graphene ruga structure: crinkle the molecular zipper**<br>Authors: Kyung-Suk Kim<br>Presenting Author: Kyung-Suk Kim |
| | 791 | **Crease nucleation in soft solids: analytic insights.**<br>Authors: Pasquale Ciarletta<br>Presenting Author: Pasquale Ciarletta |
| | 510 | **Geometrical instabilities in the highly inhomogeneous developing brain**<br>Authors: Silvia Budday, Paul Steinmann<br>Presenting Author: Silvia Budday |

## 6-1 -Nonlinear Dynamics in Mechanical and Structural Systems

Evening Session

DAY: Tuesday

ROOM: Magenta A

TIME 17.00-19.00

CHAIR: Sergey Sorokin, Stefano Lenci

**1053 Time-frequency analysis of slender frames with elasto-plastic base under seismic excitation**

Authors: Luis Fernando Paullo Muñoz, Paulo Gonçalves

Presenting Author: Luis Fernando Paullo Muñoz

**470 CAD/CAE integrated strategy for nonlinear dynamics of suspension bridges**

Authors: Giovanni Formica, Franco Milicchio, Mauro Murer

Presenting Author: Mauro Murer

**841 Nonlinear dynamic interactions in a beam-cable-beam model**

Authors: Francesco Potenza, Umberto Di Sabatino, Vincenzo Gattulli, Marco Lepidi

Presenting Author: Francesco Potenza

**1204 Nonlinear vibrations of hyperelastic spherical membranes**

Authors: Renata Soares, Pedro Felipe Amaral, Frederico Silva, Paulo Gonçalves

Presenting Author: Renata Soares

**1272 Elastic wave propagation in weakly nonlinear periodic structures**

Authors: Hvatov Alexander, Sorokin Sergey

Presenting Author: Sergey Sorokin

**1218 Fast computation of forced response in multi-degree-of-freedom nonlinear mechanical systems using integral equations**

Authors: Shobhit Jain, Thomas Breunung, George Haller

Presenting Author: Shobhit Jain/Thomas Breunung

**3-7 - Nonlinear Elasticity** Evening Session

DAY: Tuesday

ROOM: Magenta B

TIME 17.00-19.00

CHAIR: Nicholas Hill, Krishna Garikipati

**257 Improvement of identification of material parameters of HGO-model**

Authors: Hocine Bechir, Kamel Yaya

Presenting Author: Hocine Bechir

**592 Post-buckling analysis of a bilayer growing tubular tissue: semi-analytical solution and experiment**

Authors: Yang Liu, Lishuai Jin, Zongxi Cai

Presenting Author: Yang Liu

**772 Fast Parameter Inference in a Computational Model of the Left-Ventricle using Emulation**

Authors: Xiaoyu Luo, Vinny Davies, Umberto Noe, Hao Gao, Benn Macdonald, Alan Lazarus, Colin Berry, Dirk Husmeier

Presenting Author: Xiaoyu Luo

**1001 Homogenized governing equations for evolving tissues**

Authors: Salvatore Di Stefano, Raimondo Penta, Ariel Ramírez Torres, Alfio Grillo

Presenting Author: Salvatore di Stefano

**781 Magnetorheological elastomers: modeling and identification of the constitutive behavior**

Authors: Jean-Pierre Voropaieff, Laurence Bodelot, Kostas Danas, Nicolas Triantafyllidis

Presenting Author: Jean-Pierre Voropaieff

**639 Magnetorheological elastomers: an experimental approach dedicated to constitutive laws parameters identification**

Authors: Laurence Bodelot, Jean-Pierre Voropaieff, Kostas Danas, Nicolas Triantafyllidis

Presenting Author: Laurence Bodelot

## ESMC 2018 - Wednesday, July 4, 2018

8:30 **Registration**

9:00 **Europa Auditorium - PLENARY LECTURE**
Zhigang Suo (Harvard University)
Chair: Viggo Tvergaard

9:45 **Coffee Break**

| Room Cobalto | Room Ciano A | Room Ciano B | Room Gialla A | Room Gialla B | Room Bianca A | Room Bianca B | Room Europa A | Room Europa B | Room Europa C |
|---|---|---|---|---|---|---|---|---|---|
| 10:15 **3-9** 3-9 - The Physics of Dense Granular Media | **2-4** 2-4- Mechanics of Soft Biological Tissues | **1-9** 1-9 - Modelling of Fracture in Hard and Soft Materials | | | **6-2** 6-2 - Elastic Metamaterials | **3-11** 3-11 - Generalized Continua | **1-4** 1-4 - Mechanics of Textile Composite Reinforcements and Fibrous Materials | **1-10** 1-10 - Graphene and Related Materials and Systems | **7-3** 7-3 - Mechanics of Tensegrity Structures and Multifunctional Lattice Materials |
| 12:15 | | | | | | | | | |

**Euromech Fellows**

13:00 **Lunch**

| Room Cobalto |
|---|
| 14:30 **2-3** 2-3 - Mechanics of Silk: from Molecules to Orb-webs |
| 16:30 Coffee Break |
| Room Cobalto |
| 17:00 **2-3** 2-3 - Mechanics of Silk: from Molecules to Orb-webs |

**Social Program / Free afternoon**

19:00 **GROUND FLOOR**

EUROPEAN MECHANICS SOCIETY

Registration

Europa Auditorium - PLENARY LECTURE
Zhigang Suo (Harvard University)
Chair: Viggo Tvergaard

Coffee Break

| Room Indaco | Room Rossa A | Room Rossa B | Room Verde A | Room Verde B | Room Italia | Room Europa Auditorium | Room Celeste | Room Magenta A | Room Magenta B |
|---|---|---|---|---|---|---|---|---|---|
| 8-2<br>8-2 - Computational Homogenization of Nonlinear Composites | GS-3<br>General Session: Computational Mechanics | GS-5<br>General Session: Dynamics, Waves, and Metamaterials | 9-4<br>9-4 - Modeling of Additive Manufacturing Processes | GS-2<br>General Session: Composite Materials and Homogenization Theory | 3-5<br>3-5- Mechanics and Physics of Solids and Structures | 3-14<br>3-14 - Symposium Honouring Professor Norman Fleck on the Occasion of his 60th Birthday | 3-3<br>3-3 - Material Instabilities | 6-1<br>6-1 - Nonlinear Dynamics in Mechanical and Structural Systems | 3-7<br>3-7 - Nonlinear Elasticity |

Euromech Fellows

Lunch

Social Program / Free afternoon

FIRST FLOOR | SECOND FLOOR

DAY: Wednesday, July 4, 2018 Morning Session

**Plenary Lecture**

DAY: Wednesday

ROOM: Europa Auditorium

TIME 9.00-9.45

CHAIR Viggo Tvergaard

**Chemistry of fatigue**

Zhigang Suo

Coffee Break 09.45-10.15 - Ground floor and 1st floor

**3-9 - The Physics of Dense Granular Media** Morning Session

DAY: Wednesay

ROOM: Cobalto

TIME 10.15-12.15

CHAIR: Behringer, Dahmen

**1030** **Origins of Shear Jamming**

Authors: Dong Wang, Hu Zheng, Robert Behringer

Presenting Author: Robert Behringer

**717** **Shear Jamming of Frictional Spheres under Oscillatory Shear**

Authors: Michio Otsuki, Hisao Hayakawa

Presenting Author: Michio Otsuki

**1251** **Yielding and rheology near random loose packing**

Authors: Greg Farrell, Narayanan Menon

Presenting Author: Narayanan Menon

**681** **Jamming of non-circular and deformable particles**

Authors: Mark D. Shattuck, Arman Boromand, Alexandra Signoriello, Corey S. O'Hern

Presenting Author: Mark D. Shattuck

**703** **Dense packing of cell mono-layers: Jamming of deformable polygons**

Authors: Arman Boromand, Alexandra Signoriello, Fangfu Ye, Mark Shattuck, Corey S. O'Hern

Presenting Author: Arman Boromand

**1356** **Mechanisms of deformation and flow in dense granular matter**

Authors: Sinisa Dj. Mesarovic

Presenting Author: Sinisa Mesarovic

Euromech Fellows 12.15-13.00 - Europa Auditorium

Lunch 13.00-14.35 - 1st floor

## 2-4 - Mechanics of Soft Biological Tissues

Morning Session

DAY: Wednesday

ROOM: Ciano A

TIME 10.15-12.15

CHAIR: Gerhard A. Holzapfel, Ray W. Ogden

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|---|---|---|
| KEYNOTE | 1253 | **Excluding Fibers under Compression with a Discrete Fiber Dispersion Model**<br>Authors: Kewei Li, Ray W. Ogden, Gerhard A. Holzapfel<br>Presenting Author: Kewei Li |
| | 404 | **Stretch-dependent remodeling of collagen-like dispersed fibers**<br>Authors: Heiko Topol, Hasan Demirkoparan, Thomas Pence<br>Presenting Author: Heiko Topol |
| | 237 | **On the preservation of fibre direction during hyperelastic mass-growth of a finite fibre-reinforced tube**<br>Authors: Konstantinos Soldatos<br>Presenting Author: Konstantinos Soldatos |
| | 1092 | **The Generalised Structure Tensor approach for the mixed invariant I8**<br>Authors: Andrey V. Melnik, Xiaoyu Luo, Ray W. Ogden<br>Presenting Author: Andrey V. Melnik |
| | 232 | **Soft collagenous tissues: brittle or tough?**<br>Authors: Kevin Bircher, Alexander Ehret, Edoardo Mazza<br>Presenting Author: Edoardo Mazza |

Euromech Fellows 12.15-13.00 - Europa Auditorium

Lunch 13.00-14.35 - 1st floor

**1-9 - Modeling of Fracture in Hard and Sof materials** Morning Session

DAY: Wednesday

ROOM: Ciano B

TIME 10.15-12.15

CHAIR: Francesco Ascione, Sridhar Narayanaswamy

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|---|---|---|
| | **1289** | **A generalized interface model to account for anisotropic plasticity and damage at grain boundaries**<br>Authors: Shahed Rezaei, Stephan Wulfinghoff, Stefanie Reese<br>Presenting Author: Shahed Rezaei |
| | **202** | **A fracture problem with a surface energy in the Steigmann-Ogden form**<br>Authors: Anna Zemlyanova<br>Presenting Author: Anna Zemlyanova |
| **INVITED** | **1279** | **Crack bridging model - from nano to macroscale**<br>Authors: Mikhail Perelmuter, Ivan Lebedev<br>Presenting Author: Mikhail perelmuter |
| | **890** | **Failure and phase transitions in solid ceramics under uniaxial shock compression**<br>Authors: Sergey Grigoryev, Sergey Dyachkov, Anatoly Parshikov, Vasily Zhakhovsky<br>Presenting Author: Sergey Grigoryev |
| | **1072** | **Recent outcomes on the fracture propagation in brittle materials as a standard dissipative process.**<br>Authors: Francesca Fantoni, Alberto Salvadori, Paul Wawrzynek<br>Presenting Author: Francesca Fantoni |

Euromech Fellows 12.15-13.00 - Europa Auditorium

Lunch 13.00-14.35 - 1st floor

**6-2 - Elastic Metamaterials** Morning Session

DAY: Wednesday

ROOM: Bianca A

TIME 10.15-12.15

CHAIR: Prof. S. Guenneau, Prof. A.B. Movchan

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|---|---|---|
| **KEYNOTE** | **206** | **A Spin on Elastic Metamaterials**<br>Authors: Ian Jones<br>Presenting Author: Ian Jones |
| **KEYNOTE** | **1145** | **Invariant hyperelastic metamaterials and phononic media**<br>Authors: William Parnell, Pu Zhang<br>Presenting Author: William Parnell |
| **INVITED** | **235** | **Dynamics of strongly inhomogeneous periodic and thin elastic structures**<br>Authors: Julius Kaplunov<br>Presenting Author: Julius Kaplunov |
| **INVITED** | **1465** | **Multiscale structure of optimally designed viscoelastic composites**<br>Authors: Elena Cherkaev<br>Presenting Author: Elena Cherkaev |

Euromech Fellows 12.15-13.00 - Europa Auditorium

Lunch 13.00-14.35 - 1st floor

**3-11 - Generalized Continua** Morning Session

DAY: Wednesday

ROOM: Bianca B

TIME 10.15-12.15

CHAIR: Panos Gourgiotis, Victor Eremeyev

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| KEYNOTE | 679 | **Band Gaps for Wave Propagation in 2-D Periodic Composite Structures Incorporating Microstructure Effects**<br>Authors: Gongye Zhang, Xin-Lin Gao, Shurong Ding<br>Presenting Author: Xin-Lin Gao |
| | 782 | **Frequency dependent acoustic beam focusing and steering in hexagonal lattices using a strain gradient model**<br>Authors: Giuseppe Rosi, Nicolas Auffray<br>Presenting Author: Giuseppe Rosi |
| | 1323 | **Can generalized continuum theories forecast size effects in materials with periodic inclusions?**<br>Authors: Marcus Wheel<br>Presenting Author: Marcus Wheel |
| | 1285 | **Antiplane problems of flexoelectric materials: a screw dislocation moving with constant velocity**<br>Authors: Antonios Giannakopoulos, Thanasis Zisis<br>Presenting Author: Antonios Giannakopoulos |

Euromech Fellows 12.15-13.00 - Europa Auditorium

Lunch 13.00-14.35 - 1st floor

## 1-4 - Mechanics of Textile Composite Reinforcements and Fibrous Materials

Morning Session

DAY: Wednesday

ROOM: Europa A

TIME 10.15-12.15

CHAIR: Boisse P., Hojo M.

**1091** **Thermo-chemo-mechanically coupled model of resin infusion process in porous media**

Authors: Ruoyu Huang

Presenting Author: Ruoyu Huang

**1160** **Aegagropilae: mechanical and structural properties of a natural fiber cluster**

Authors: Sébastien Moulinet, Gautier Verhille, Nicolas Vandenberghe, Mokhtar Adda-Bedia, Patrice Le Gal

Presenting Author: Sébastien Moulinet

**1384** **Toughening mechanisms and damage development in nanocomposites with spatially distributed nanotubes as revealed by modelling**

Authors: Qiang Liu, Stepan Lomov, Larissa Gorbatikh

Presenting Author: Qiang Liu

**1388** **Feasibility Study of HPPE Composite Bar applied to Concrete**

Authors: Hsien Hua Lee, T.-Y. Wu

Presenting Author: Hsien Hua Lee

**1527** **Analysis of taylored fiber placement carbon fiber panels manufactured by infusion**

Authors: Cassius Riul, Edgar Sato, Eric Olifiers, Gerson Marinucci

Presenting Author: Gerson Marinucci

**293** **Fabrication and mechanical characterization of electrospun scaffolds for tendon and ligament repair**

Authors: Alberto Sensini, Maria Letizia Focarete, Chiara Gualandi, Juri Belcari, Andrea Zucchelli, Carlo Gotti, Alexander Kao, Gianluca Tozzi

Presenting Author: Luca Cristofolini

Euromech Fellows 12.15-13.00 - Europa Auditorium

Lunch 13.00-14.35 - 1st floor

**1-10 - Graphene and Related Materials and Systems** Morning Session

DAY: Wednesday

ROOM: Europa B

TIME 10.15-12.15

CHAIR: Costas Galiotis, Nicola M. Pugno

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| **1187** | **A Van der Waals Dislocation Framework for Moire Engineering in 2D Materials** |
| | Authors: Harley Johnson, Brian McGuigan, Pascal Pochet |
| | Presenting Author: Harley Johnson |
| **1381** | **Experimental characterization of carbon microfibres wettability** |
| | Authors: Ilaria Corridori, Claudio Della Volpe, Stefano Siboni, Nicola M. Pugno |
| | Presenting Author: Ilaria Corridori |
| **1410** | **Fabrication, testing and modelling of the mechanics of graphene and graphene oxide composite electrospun nanofibers** |
| | Authors: David Novel, Alessandro Pegoretti, Nicola M. Pugno |
| | Presenting Author: David Novel |
| **1421** | **Fluid-structure interactions in graphene nano-hydrodynamics** |
| | Authors: Giulia Salussolia, Catherine Kamal, Simon Gravelle, Nicola M. Pugno, Lorenzo Botto |
| | Presenting Author: Lorenzo Botto |
| **1449** | **Multiscale modelling of planar fiber networks: current results for mechanics of paper, and potential applications to related materials** |
| | Authors: Pedro Miguel J. S. Godinho, Marina Jajcinovic, Wolfgang Bauer, Christian Hellmich |
| | Presenting Author: Pedro Godinho |
| **1548** | **3D metamaterial with programmable anisotropic properties** |
| | Authors: Soroush Kamrava, Ashkan Vaziri |
| | Presenting Author: Ashkan Vaziri |

Euromech Fellows 12.15-13.00 - Europa Auditorium

Lunch 13.00-14.35 - 1st floor

**7-3 - Mechanics of Tensegrity Structures and Multifunctional Lattice Materials**

Morning Session

DAY: Wednesday

ROOM: Europa C

TIME 10.15-12.15

CHAIR: Fernando Fraternali, Robert E. Skelton

**304** **2-D lattice structures and band gaps. A numerical analysis**

Authors: Agostina Orefice, Raffaele Miranda, Geminiano Mancusi

Presenting Author: Agostina Orefice

**593** **A nonlinear model for the out-of-plane behaviour of single-layer graphene sheets**

Authors: Alessandra Genoese, Andrea Genoese, Nicola L. Rizzi, Ginevra Salerno

Presenting Author: Andrea Genoese

Euromech Fellows 12.15-13.00 - Europa Auditorium

Lunch 13.00-14.35 - 1st floor

## 8-2 -Computational Homogenization of Nonlinear Composites

Morning Session

DAY: Wednesday

ROOM: Indaco

TIME 10.15-12.15

CHAIR: Djimédo Kondo, Stephan Wulfinghoff

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|---|---|---|
| KEYNOTE | 1041 | **Model Order Reduction and Computational Homogenisation of Magnetorheological Elastomers**<br>Authors: Benjamin Brands, Julia Mergheim, Paul Steinmann<br>Presenting Author: Benjamin Brands |
| | 1148 | **TFA homogenisation procedure for porous materials**<br>Authors: Federica Covezzi, Stefano de Miranda, Sonia Marfia, Elio Sacco<br>Presenting Author: Federica Covezzi |
| | 1343 | **Homogenization method for a proposed model describing the melting of a nuclear fuel material**<br>Authors: Veronica D'Ambrosi, Jean-Marie Gatt, Frederic Lebon, Jerome Julien, Daniel Parrat, Christophe Destouches<br>Presenting Author: Veronica D'Ambrosi |
| | 723 | **Computational homogenization of nonlinear fibre-reinforced composite materials with the Virtual Element Method**<br>Authors: Edoardo Artioli, Sonia Marfia, Elio Sacco<br>Presenting Author: Edoardo Artioli |
| | 625 | **Effects of various microscopic boundary conditions on the macroscopic response of MREs in computational homogenization**<br>Authors: Reza Zabihyan, Julia Mergheim, Jean-Paul Pelteret, Benjamin Brands, Paul Steinmann<br>Presenting Author: Reza Zabihyan |

Euromech Fellows 12.15-13.00 - Europa Auditorium

Lunch 13.00-14.35 - 1st floor

**GS-3 Computational Mechanics** Morning Session

DAY: Wednesday

ROOM: Rossa A

TIME 10.15-12.15

CHAIR: Hamid Reza Bayat, Domenico Magisano

**429 A locking-free symmetric hybrid discontinuous Galerkin method for large deformations**

Authors: Hamid Reza Bayat, Stephan Wulfinghoff, Stefanie Reese

Presenting Author: Hamid Reza Bayat

**547 An alternative numerical technique for solving boundary value problems involving viscoelastic materials**

Authors: Ananthapadmanabhan S., Saravanan U.

Presenting Author: Ananthapadmanabhan Sreekumar

**566 The threshold displacement energy of deformed beta-SiC**

Authors: Xiaoxiong Song, Lisha Niu

Presenting Author: Xiaoxiong Song

**588 An efficient return mapping scheme for yield functions expressed as Minkowski sum: applications in nonlinear analysis of 3D frames**

Authors: Giovanni Garcea, Domenico Magisano, Francesco Liguori, Leonardo Leonetti

Presenting Author: Domenico Magisano

**658 Ductile Crack Initiation under Mixed Mode Loading**

Authors: Rasmus Andersen, Brian Legarth, Kim Nielsen

Presenting Author: Rasmus Andersen

**903 A fully thermodynamically coupled model for thermo-viscoplasticity with application to thermal buckling**

Authors: Katharina Martin, Stefanie Reese

Presenting Author: Katharina Martin

Euromech Fellows 12.15-13.00 - Europa Auditorium

Lunch 13.00-14.35 - 1st floor

**GS-5 Dynamics, Waves and Metamaterials** Morning Session

DAY: Wednesday

ROOM: Rossa B

TIME 10.15-12.15

CHAIR: Domenico Tallarico, Ashwin Sridhar

**325 The coupled-mode interface and nested Bloch waves**

Authors: Davide Bigoni, Domenico Tallarico, Natalia V. Movchan, Alexander B. Movchan, Francesco Dal Corso

Presenting Author: Domenico Tallarico

**436 Numerical method to calculate 1D-impact problems for rods of non constant cross sections and its inverse solution**

Authors: Jens Burgert, Wolgang Seemann

Presenting Author: Jens Burgert

**474 Multiscale modeling of complex emergent elastodynamics in metamaterials**

Authors: Ashwin Sridhar, Varvara Kouznetsova, Marc Geers

Presenting Author: Ashwin Sridhar

**578 Interactions of highly nonlinear solitary waves with plastically compressible solids**

Authors: Andreas Schiffer, Eunho Kim, Tae-Yeon Kim

Presenting Author: Andreas Schiffer

**596 Near-resonance asymptotic model for wave propagation in an orthotropic half-plane**

Authors: Andrea Nobili, Danila Prikazchikov

Presenting Author: Andrea Nobili

**876 Impact on floating elastic films: wrinkle coarsening and the role of fluid inertia**

Authors: Doireann O'Kiely, Finn Box, Ousmane Kodio, Alfonso Castrejon-Pita, Jonathan Whiteley, Dominic Vella

Presenting Author: Doireann O'Kiely

Euromech Fellows 12.15-13.00 - Europa Auditorium

Lunch 13.00-14.35 - 1st floor

## 9-4 - Modeling of Additive Manufacturing Processes

Morning Session

DAY: Wednesday

ROOM: Verde A

TIME 10.15-12.15

CHAIR: F. Auricchio, E. Salsi

**352** **Modeling of Stress-Driven Deformations in Direct Laser Writing**

Authors: Anton Bauhofer, Chiara Daraio

Presenting Author: Anton Bauhofer

**364** **Computational large strain curing framework of extrusion based Additive Manufacturing Processes**

Authors: Philipp Hartmann, Christian Weißenfels, Peter Wriggers

Presenting Author: Philipp Hartmann

**654** **Imperfection sensitivity of three-dimensional lattices built with selective laser sintering**

Authors: Lu Liu, Damiano Pasini

Presenting Author: Lu Liu

**1320** **Multiphysics numerical modelling of architectured lattice structures**

Authors: Gregory Antoni

Presenting Author: Gregory Antoni

Euromech Fellows 12.15-13.00 - Europa Auditorium

Lunch 13.00-14.35 - 1st floor

**GS-2 Composite Materials and Homogenization Theory** Morning Session

DAY: Wednesday

ROOM: Verde B

TIME 10.15-12.15

CHAIR: Luca Lanzoni, Luciano Rosati

**469 Overall elastic properties of a plate containing inhomogeneities of irregular shape**

Authors: Luca Lanzoni, Enrico Radi, Igor Sevostianov

Presenting Author: Luca Lanzoni

**1208 Impact of the process on dispersion and consequences on mechanical properties of PMMA with embedded silica**

Authors: Anne-Sophie Caro-Bretelle, Alexandra Siot, Romain Leger, Claire Longuet, Belkacem Otazaghine, Nathalie Azema

Presenting Author: Anne-Sophie Caro

**1324 Simulation of high-temperature creep in directionally solidified NiAl-Mo eutectics**

Authors: Daniel Wicht, Jürgen Albiez, Matti Schneider, Thomas Böhlke

Presenting Author: Daniel Wicht

**1358 Analytical expression of the Eshelby tensor for polyhedral inclusions**

Authors: Giulio Zuccaro, Daniela De Gregorio, Salvatore Trotta, Salvatore Sessa, Francesco Marmo, Luciano Rosati

Presenting Author: Luciano Rosati

**1474 Micro-Mechanical Analysis of Piezo-Fiber Reinforced Composites using Variational Asymptotic Method**

Authors: Akshay Kumar, Ajinkya Vishnu Sirsat, Srikant Sekhar Padhee

Presenting Author: Srikant Sekhar Padhee

Euromech Fellows 12.15-13.00 - Europa Auditorium

Lunch 13.00-14.35 - 1st floor

**3-5 - Mechanics and Physics of Solids and Structures** Morning Session

DAY: Wednesday

ROOM: Italia

TIME 10.15-12.15

CHAIR: M. Potier-Ferry, D. Moulton

**641** **Buckling of precisely imperfect shells: New results on an old problem**

Authors: Pedro Reis, Anna Lee, Francisco López Jiménez, Joel Marthelot, John Hutchinson

Presenting Author: Pedro Reis

**1319** **Elastic buckling of perfect cylinders under axial loading**

Authors: Gabriel Rossetto, Roberta Springhetti, Davide Bigoni

Presenting Author: Gabriel Rossetto

**657** **Snap-through in pressurless spherical caps**

Authors: Matteo Taffetani, Xin Jiang, Douglas Holmes, Dominic Vella

Presenting Author: Matteo Taffetani

**731** **From turbulence transition to the buckling of a soda can**

Authors: Tobias M. Schneider

Presenting Author: Tobias M. Schneider

**635** **Plate Models for Buckling Analysis**

Authors: David Robinson, Draga Pihler-Puzovic, Matthias Heil

Presenting Author: David George Robinson

**645** **How strong is a soda can: The stability landscape for shell buckling**

Authors: Shmuel Rubinstein, Emmanuel Virot, Tobias Schneider

Presenting Author: Shmuel Rubinstein

Euromech Fellows 12.15-13.00 - Europa Auditorium

Lunch 13.00-14.35 - 1st floor

**3-14 - Symposium honouring Prof. Fleck on the occasion of his 60th birthday** Morning Session

DAY: Wednesday

ROOM: Europa Auditorium

TIME 10.15-12.15

CHAIR: Norman Fleck, Frank Zok

**307 Failure modes of bolt and nut assemblies under tensile loading**

Authors: Magnus Langseth, Erik Grimsmo, Arild Clausen

Presenting Author: Magnus Langseth

**536 Friction between a dry fibre bundle and rough or smooth surfaces**

Authors: Sutcliffe Michael, Daniel Mulvihill, Olga Smerdova

Presenting Author: Michael Sutclife

**515 Bayesian inference of the spatial distribution of material properties**

Authors: Vikram Deshpande, Andrea Vigliotti, Gabor Csanyi

Presenting Author: Vikram Deshpande

**445 Nonlocal response of composites allowing for three-point statistics**

Authors: John Willis

Presenting Author: John Willis

Euromech Fellows 12.15-13.00 - Europa Auditorium

Lunch 13.00-14.35 - 1st floor

**3-3 - Material Instabilities** Morning Session

DAY: Wednesday

ROOM: Celeste

TIME 10.15-12.15

CHAIR: Ahmed Benallal & Henryk Petryk

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|---|---|---|
| **KEYNOTE** | **553** | **Influence of a smooth elastic-inelastic transition model on control of localization**<br>Authors: Forest Samuel, Rubin Miles B.<br>Presenting Author: Forest Samuel |
| **INVITED** | **491** | **Thermodynamic stability in dissipative materials – the concept and consequences**<br>Authors: Henryk Petryk<br>Presenting Author: Henryk Petryk |
| **INVITED** | **1346** | **Grain Boundaries in Polycrystalline Plasticity**<br>Authors: Tuncay Yalcinkaya, Izzet Ozdemir<br>Presenting Author: Tuncay Yalcinkya |
| | **938** | **Prediction of loss of uniqueness in elastic-plastic tubes at finite deformation: competition between buckling and shear band localization**<br>Authors: Moubine Al Kotob, Samuel Forest, Matthieu Maziere, Tonya Rose<br>Presenting Author: Moubine Al Kotob |

Euromech Fellows 12.15-13.00 - Europa Auditorium

Lunch 13.00-14.35 - 1st floor

## 6-1 -Nonlinear Dynamics in Mechanical and Structural Systems

Morning Session

DAY: Wednesday

ROOM: Magenta A

TIME 10.15-12.15

CHAIR: Oded Gottlieb, Francesco Pellicano

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|---|---|---|
| KEYNOTE | 685 | **Periodic orbit optimization in dynamical systems with delay**<br>Authors: Zaid Ahsan, Harry Dankowicz, Jan Sieber<br>Presenting Author: Harry Dankowicz |
| | 651 | **Chaos control applied to shape memory alloy systems using thermal actuation**<br>Authors: Dimitri Costa, Marcelo Savi, Aline de Paula<br>Presenting Author: Marcelo Savi |
| | 1228 | **Discrete time partial control of a chaotic system in the presence of white Gaussian noise**<br>Authors: Vipin Agarwall, Balakumar Balachandran<br>Presenting Author: Balakumar Balachandran |
| | 1217 | **Modelling of drill-string dynamics for stick-slip suppression**<br>Authors: Mohammad Khodadadi Dehkordi, Marcin Kapitaniak, Marian Wiercigroch<br>Presenting Author: Mohammad Khodadadi Dehkordi |
| | 267 | **Nonlinear energy sink for passive control of cable's large amplitude vibrations**<br>Authors: Tieding Guo, Lianhua Wang, Houjun Kang<br>Presenting Author: Tieding Guo |

Euromech Fellows 12.15-13.00 - Europa Auditorium

Lunch 13.00-14.35 - 1st floor

## 3-7 - Nonlinear Elasticity

Morning Session

DAY: Wednesday

ROOM: Magenta B

TIME 10.15-12.15

CHAIR: Roger Bustamante, Yibin Fu

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| KEYNOTE | 1274 | **Electro-viscoelastic behaviour of dielectric elastomers - experiment and microsphere-based modelling**<br>Authors: Andreas Menzel, Sara Thylander, Matti Ristinmaa<br>Presenting Author: Andreas Menzel |
| | 207 | **Tunable band gaps in a compressible dielectric elastomer thin cylinder with periodically applied voltages**<br>Authors: Bin Wu, Weiqiu Chen<br>Presenting Author: Weiqiu Chen |
| | 1422 | **Catastrophe Modeling of Soft Materials and Structures**<br>Authors: Yu-Xin Xie, Zhigang Suo, Yibin Fu<br>Presenting Author: Yu-Xin Xie |
| | 309 | **Nonlinear behaviours of dielectric elastomers under electromechanical coupling loadings**<br>Authors: Tongqing Lu, Zhigang Suo, Tiejun Wang<br>Presenting Author: Tongqing Lu |
| | 1133 | **Necking of an electroelastic plate**<br>Authors: Luis Dorfmann, Yibin Fu<br>Presenting Author: Luis Dorfmann |

Euromech Fellows 12.15-13.00 - Europa Auditorium

Lunch 13.00-14.35 - 1st floor

**2-3 - Mechanics of Silk: from Molecules to Orb-webs** Afternoon Session

DAY: Wednesday

ROOM: Cobalto

TIME 14.30-16.30

CHAIR: Frauke Graeter, Nicola M. Pugno

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| KEYNOTE | 407 | **Making biomimetic spider silk**<br>Authors: Jan Johansson, Anna Rising<br>Presenting Author: Anna Rising and Jan Johansson |
| | 408 | **Understanding the effect of extensional flow on native silk proteins**<br>Authors: Andreas Koeppel, Chris Holland<br>Presenting Author: Andreas Koeppel |
| | 433 | **Insights into the flow processing of silks**<br>Authors: Chris Holland, Pete Laity, Jamie Sparkes, Anastasia Brif, Andreas Koeppel, Quan Wan, Nicola Stehling, Richard Hodgkinson<br>Presenting Author: Chris Holland |
| | 1368 | **Multiscale simulation of directed spider dragline silk self-assembly by flow**<br>Authors: Ana Herrera, Martin Mojica-Benavides, Anil Kumar Dassana, Ulrich Schwarz, Mattias Goksor, Caroline B. Adiels, Frauke Graeter<br>Presenting Author: Ana Herrera |
| | 1270 | **Experimental studies of spider silk micro-fiber formation using optical tweezers and microfluidics**<br>Authors: Martin Mojica-Benavides, Ana Maria Herrera, Frauke Graeter, Caroline Adiels<br>Presenting Author: Martin Mojica Benavides |

Coffee Break 16.30-17.00 - 1st floor

## 2-3 - Mechanics of Silk: from Molecules to Orb-webs

Evening Session

DAY: Wednesday

ROOM: Cobalto

TIME 17.00-19.00

CHAIR: Frauke Graeter, Nicola M. Pugno

**799** **Straining Flow Spinning: A versatile technique for the production of bioinspired silk fibers**

Authors: José Pérez-Rigueiro, Alfonso María Gañán-Calvo, Manuel Elices, Gustavo Víctor Guinea

Presenting Author: José Pérez-Rigueiro

**967** **Inhomogeneity of Longitudinal Mechanical Properties in Spider Silk Revealed by Cryo-SEM**

Authors: Nicola Stehling, Christopher Holland, Cornelia Rodenburg

Presenting Author: Nicola Stehling

**1151** **Structure and dynamics of silkworm silk and spider silk**

Authors: Igor Krasnov, Imke Greving, Malte Blankenburg, Martin Müller

Presenting Author: Martin Müller

**484** **Foundation of the outstanding toughness of biomimetic spider silk**

Authors: Martin Humenik, Aniela Heidebrecht, Christopher Thamm, Joschka Bauer, Friedrich Kremer, Thomas Scheibel

Presenting Author: Martin Humenik

**507** **Failure Mechanisms of Spider Silk Inspired Fibers Made by Instability-Assisted 3D Printing**

Authors: Shibo Zou, Daniel Therriault, Frédérick P. Gosselin

Presenting Author: Shibo Zou

**858** **Emerging order in silk fibers**

Authors: Johannes Wagner, Imke Greving, Konstantinos Gkagkas, Martin Mueller, Tilo Seydel, Eduardo Cruz-Chu, Frauke Graeter

Presenting Author: Frauke Gräter

## ESMC 2018 - Thursday, July 5, 2018

**8:30** Registration

**9:00** Europa Auditorium - GENERAL LECTURE
Bernhard Schrefler (Università di Padova)
Chair: Gerhard A. Holzapfel

**9:45** Coffee Break

| Room Cobalto | Room Ciano A | Room Ciano B | Room Gialla A | Room Gialla B | Room Bianca A | Room Bianca B | Room Europa A | Room Europa B | Room Europa C |
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| **10:15** | | | | | | | | | |
| 3-9<br>3-9 - The Physics of Dense Granular Media | 2-4<br>2-4- Mechanics of Soft Biological Tissues | 1-9<br>1-9 - Modelling of Fracture in Hard and Soft Materials | | | 6-2<br>6-2 - Elastic Metamaterials | 3-11<br>3-11 - Generalized Continua | 8-2<br>8-2 - Computational Homogenization of Nonlinear Composites | 3-6<br>3-6 - Multi-Physics of Solids at Fracture | 1-8<br>1-8 - Topology Optimization for Additive Manufacturing |

**12:15** Lunch & Poster Session

**13:45** Europa Auditorium - PLENARY LECTURE
Thomas Pardoen (Ecole Polytechnique de Louvain)
Chair: John Hutchinson

| Room Cobalto | Room Ciano A | Room Ciano B | Room Gialla A | Room Gialla B | Room Bianca A | Room Bianca B | Room Europa A | Room Europa B | Room Europa C |
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| **14:30** | | | | | | | | | |
| 3-9<br>3-9 - The Physics of Dense Granular Media | 2-4<br>2-4- Mechanics of Soft Biological Tissues | 1-9<br>1-9 - Modelling of Fracture in Hard and Soft Materials | | | 6-2<br>6-2 - Elastic Metamaterials | 1-1<br>1-1 - Mechanics of Composite Materials | 8-2<br>8-2 - Computational Homogenization of Nonlinear Composites | 3-6<br>3-6 - Multi-Physics of Solids at Fracture | 1-8<br>1-8 - Topology Optimization for Additive Manufacturing |

**16:30** Coffee Break

| Room Cobalto | Room Ciano A | Room Ciano B | Room Gialla A | Room Gialla B | Room Bianca A | Room Bianca B | Room Europa A | Room Europa B | Room Europa C |
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| **17:00** | | | | | | | | | |
| 3-9<br>3-9 - The Physics of Dense Granular Media | 2-4<br>2-4- Mechanics of Soft Biological Tissues | 7-2<br>7-2 - Steel Structures: Mechanics, Simulation and Testing | | | 6-2<br>6-2 - Elastic Metamaterials | 1-1<br>1-1 - Mechanics of Composite Materials | 8-2<br>8-2 - Computational Homogenization of Nonlinear Composites | 3-6<br>3-6 - Multi-Physics of Solids at Fracture | 1-8<br>1-8 - Topology Optimization for Additive Manufacturing |

**19:00**

**20:00** Conference Dinner
GROUND FLOOR

EUROPEAN MECHANICS SOCIETY

## Registration

Europa Auditorium - GENERAL LECTURE
Bernhard Schrefler (Università di Padova)
Chair: Gerhard A. Holzapfel

## Coffee Break

| Room Indaco | Room Rossa A | Room Rossa B | Room Verde A | Room Verde B | Room Italia | Room Europa Auditorium | Room Celeste | Room Magenta A | Room Magenta B |
|---|---|---|---|---|---|---|---|---|---|
| 9-3<br>9-3 - Variational Methods in Constitutive Modelling for Multi-physics Problems | GS-3<br>General Session: Computational Mechanics | 2-3<br>2-3 - Mechanics of Silk: from Molecules to Orb-webs | GS-5<br>General Session: Dynamics, Waves, and Metamaterials | 2-6<br>2-6 - Mechanics of Mineralised Tissues and Biomaterials | 3-5<br>3-5- Mechanics and Physics of Solids and Structures | 3-1<br>3-1 - Contact Mechanics | 3-10<br>3-10 - Mechanics of Generalized Continua with Cohesion-adhesion Interactions and their Applications to Size-dependent Thin Structures | 6-1<br>6-1 - Nonlinear Dynamics in Mechanical and Structural Systems | 3-7<br>3-7 - Nonlinear Elasticity |

## Lunch & Poster Session

Europa Auditorium - PLENARY LECTURE
Thomas Pardoen (Ecole Polytechnique de Louvain)
Chair: John Hutchinson

| Room Indaco | Room Rossa A | Room Rossa B | Room Verde A | Room Verde B | Room Italia | Room Europa Auditorium | Room Celeste | Room Magenta A | Room Magenta B |
|---|---|---|---|---|---|---|---|---|---|
| 9-3<br>9-3 - Variational Methods in Constitutive Modelling for Multi-physics Problems | GS-3<br>General Session: Computational Mechanics | | GS-5<br>General Session: Dynamics, Waves, and Metamaterials | | 3-5<br>3-5- Mechanics and Physics of Solids and Structures | 3-1<br>3-1 - Contact Mechanics | 3-10<br>3-10 - Mechanics of Generalized Continua with Cohesion-adhesion Interactions and their Applications to Size-dependent Thin Structures | 6-1<br>6-1 - Nonlinear Dynamics in Mechanical and Structural Systems | 3-7<br>3-7 - Nonlinear Elasticity |

## Coffee Break

| Room Indaco | Room Rossa A | Room Rossa B | Room Verde A | Room Verde B | Room Italia | Room Europa Auditorium | Room Celeste | Room Magenta A | Room Magenta B |
|---|---|---|---|---|---|---|---|---|---|
| 9-1<br>-1 - Multi-scale Solids and Homogenization | 5-5<br>5-5 - Non-local Models for Damage and Fracture | 7-5<br>7-5 - New Concepts for Advanced Materials and Structures | 6-4<br>6-4 - Nonlinear waves in solids | 1-2<br>1-2 - The Virtual Concrete Lab: Modelling the Behaviour of Concrete from Fresh State to Long Term Durability | 3-5<br>3-5- Mechanics and Physics of Solids and Structures | 3-1<br>3-1 - Contact Mechanics | 3-10<br>3-10 - Mechanics of Generalized Continua with Cohesion-adhesion Interactions and their Applications to Size-dependent Thin Structures | 6-1<br>6-1 - Nonlinear Dynamics in Mechanical and Structural Systems | |

## Conference Dinner

FIRST FLOOR SECOND FLOOR

DAY: Thursday, July 5, 2018

## Morning Session

**General Lecture**

DAY: Thursday

ROOM: Europa Auditorium

TIME 9.00-9.45

CHAIR: Gerhard A. Holzapfel

**Dynamics of fracturing saturated porous media**

Bernhard Schrefler

Coffee Break 09.45-10.15 - Ground floor and 1st floor

**3-9 - The Physics of Dense Granular Media** Morning Session

DAY: Thursday

ROOM: Cobalto

TIME 10:15-12:15

CHAIR: O'Hern, Chakraborty

**241** **Meso-scale models for amorphous plasticity**

Authors: Botond Tyukodi, Kareem Abdelshafy, Damien Vandembroucq, Maloney Craig

Presenting Author: Craig E. Maloney

**709** **Universal slip dynamics in dense granular materials and bulk metallic glasses: Theory compared to experiments**

Authors: Karin Dahmen, Dmitry Denisov, Kinga Lorincz, Wendelin Wright, Todd Hufnagel, Aya Nawano, Xiaojun Gu, Jonathan Uhl

Presenting Author: Karin Dahmen

**1182** **When granular materials are easy**

Authors: Ken Kamrin, Hesam Askari, James Slonaker, Stephen Townsend, Qiong Zhang

Presenting Author: Ken Kamrin

**947** **Force transmission in granular materials**

Authors: K.P. Krishnaraj, Prabhu Nott

Presenting Author: Krishnaraj K.P.

**1518** **Micromechanical study of the elastic stiffness in frictional granular solids**

Authors: Kianoosh Taghizadeh, Vanessa Magnanimo, Stefan Luding

Presenting Author: Kianoosh Taghizadeh

**691** **Comparison of the Force Network Topology of the 2D and 3D Granular Systems**

Authors: Lenka Kovalcinova, Angelo Taranto, Lou Kondic

Presenting Author: Lenka Kovalcinova

Lunch 12.15 - 13.45 - 1st floor

Poster Session 12.15 - 13.45 Ground floor

## 2-4 - Mechanics of Soft Biological Tissues

Morning Session

DAY: Thursday

ROOM: Ciano A

TIME 10:15-12:15

CHAIR: Bjørn Skallerud, Daniel Haspinger

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|---|---|---|
| KEYNOTE | 786 | **A calcium dependent multiscale contractility model of fibroblast - substrate interactions under cyclic stretch**<br>Authors: Siddhartha Jaddivada, Namrata Gundiah<br>Presenting Author: Namrata Gundiah |
| | 1238 | **The interrelation between smooth muscle orientation and intracellular filament structure in the human abdominal aorta: a numerical analysis**<br>Authors: Daniel Ch. Haspinger, Sae-Il Murtada, Justyna A. Niestrawska, Gerhard A. Holzapfel<br>Presenting Author: Daniel Ch. Haspinger |
| | 1560 | **Simulation of the uterine contractions and foetus expulsion using a chemo-mechanical constitutive model**<br>Authors: Maria Vila Pouca, João Ferreira, Dulce Oliveira, Marco Parente, Renato Natal Jorge<br>Presenting Author: Maria Vila Pouca |
| | 1495 | **Modelling of soft tissue and reduced muscle activation in the soft palate related to obstructive sleep apnea**<br>Authors: Hongliang Liu, Victorien Prot, Bjørn Skallerud<br>Presenting Author: Bjørn Skallerud |
| | 1367 | **Pattern formation by cells acting as strain-cued automata**<br>Authors: Brian Cox<br>Presenting Author: Brian Cox |

Lunch 12.15 - 13.45 - 1st floor

Poster Session 12.15 - 13.45 Ground floor

**1-9 - Modeling of Fracture in Hard and Sof materials** Morning Session

DAY: Thursday

ROOM: Ciano B

TIME 10.15-12.15

CHAIR: Irene Arias, Luigi Gambarotta

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| **INVITED** | **599** | **The bridged crack model with multiple fibres: Scale effects and local instabilities**<br>Authors: Alberto Carpinteri, Federico Accornero<br>Presenting Author: Federico Accornero |
| | **627** | **Effective toughness of heterogeneous elasto-plastic materials**<br>Authors: Stella Brach, Blaise Bourdin, Kaushik Bhattacharya<br>Presenting Author: Stella Brach |
| | **1132** | **Manifestations of flexoelectricity in the fracture mechanics of dielectrics and ferroelectrics**<br>Authors: Amir Abdollahi, Irene Arias<br>Presenting Author: Amir Abdollahi |
| | **759** | **Influence of a small flaw on the strength of ceramics**<br>Authors: Dominique Leguillon, Eric Martin, Raul Bermejo<br>Presenting Author: Dominique Leguillon |
| | **452** | **Effect of interface thicknesses on the phase field modeling of crack propagation in heterogeneous materials.**<br>Authors: Herve Henry<br>Presenting Author: Herve Henry |
| | **909** | **A homogenized approach for delamination fracture in layered beams**<br>Authors: Hossein Darban, Roberta Massabò<br>Presenting Author: Hossein Darban |

Lunch 12.15 - 13.45 - 1st floor

Poster Session 12.15 - 13.45 Ground floor

## 6-2 - Elastic Metamaterials

Morning Session

DAY: Thursday

ROOM: Bianca A

TIME 10.15-12.15

CHAIR: Prof. S. Guenneau, Dr. D. Misseroni

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| **KEYNOTE** | **1570** | **Conversion of waves by trees**<br>Authors: Jean Jacques Marigo<br>Presenting Author: Jean Jacques Marigo |
| **KEYNOTE** | **328** | **Mechanics of inter-modal tunneling in nonlinear metamaterials**<br>Authors: R. Ganesh, Weijian Jiao, Stefano Gonella<br>Presenting Author: Stefano Gonella |
| | **834** | **Wave localisation near semi-infinite and finite clusters of resonators in flexural plates**<br>Authors: Alexander Movchan, Richard Craster, Stewart Haslinger, Ian Jones, Natasha Movchan, Ross McPhedran, Giorgio Carta<br>Presenting Author: Alexander Movchan |
| | **939** | **Waves coupling and localisation in a geometrically chiral elastic lattice**<br>Authors: Natasha Movchan, Domenico Tallarico, Alexander Movchan, Daniel Colquitt<br>Presenting Author: Natasha Movchan |

Lunch 12.15 - 13.45 - 1st floor

Poster Session 12.15 - 13.45 Ground floor

**3-11 - Generalized Continua** Morning Session

DAY: Thursday

ROOM: Bianca B

TIME 10.15-12.15

CHAIR: Antonios Giannakopoulos, Markus Wheel

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| KEYNOTE | 272 | **On the wave dispersion in microstructured solids**<br>Authors: Arkadi Berezovski, Francesco dell'Isola<br>Presenting Author: Arkadi Berezovski |
| | 280 | **On weak solutions within the reduced linear strain gradient elasticity**<br>Authors: Victor Eremeyev, Francesco dell'Isola<br>Presenting Author: Victor Eremeyev |
| | 322 | **A micromorphic approach to nematic liquid crystals**<br>Authors: Maurizio Romeo<br>Presenting Author: Maurizio Romeo |
| | 906 | **Nonlocal micropolar dislocation based fracture mechanics**<br>Authors: Mahmoud Mousavi<br>Presenting Author: Mahmoud Mousavi |
| | 269 | **Interaction integral method for extracting stress intensity factors and couple-stress intensity factors of a crack in micropolar materials**<br>Authors: Hongjun Yu, Meinhard Kuna<br>Presenting Author: Hongjun Yu |

Lunch 12.15 - 13.45 - 1st floor

Poster Session 12.15 - 13.45 Ground floor

## 8-2 -Computational Homogenization of Nonlinear Composites

Morning Session

DAY: Thursday

ROOM: Europa A

TIME 10.15-12.15

CHAIR: Federica Covezzi, Elio Sacco

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| **KEYNOTE** | **1399** | **Multiscale modeling using finite elements, fast Fourier transforms and proper orthogonal decomposition**<br>Authors: Stefanie Reese, Julian Kochmann, Bob Svendsen, Stephan Wulfinghoff<br>Presenting Author: Stefanie Reese |
| | **1203** | **Homogenization of composite materials comprising bimodular phases**<br>Authors: Elisabetta Monaldo, Antoine Lucchetta, Stella Brach, Djimedo Kondo, Giuseppe Vairo<br>Presenting Author: Elisabetta Monaldo |
| | **863** | **Space-time model order reduction for dissipative cyclic problems**<br>Authors: Felix Fritzen, Mohammadreza Hassani<br>Presenting Author: Felix Fritzen |
| | **344** | **Model Order Reduction of Nonlinear Homogenization Problems Using a Hashin-Shtrikman Type Finite Element Method**<br>Authors: Stephan Wulfinghoff, Fabiola Cavaliere, Stefanie Reese<br>Presenting Author: Stephan Wulfinghoff |
| | **705** | **Two-stage data-assisted mechanical homogenization**<br>Authors: Oliver Kunc, Felix Fritzen<br>Presenting Author: Oliver Kunc |

Lunch 12.15 - 13.45 - 1st floor

Poster Session 12.15 - 13.45 Ground floor

**3-6 - Multi-Physics of Solids at Fracture** Morning Session

DAY: Thursday

ROOM: Europa B

TIME 10.15-12.15

CHAIR: B. Schefler, G. Mishuris

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| KEYNOTE | 1515 | **Numerical simulation of hydraulic fracture growth: advances and remaining challenges**<br>Authors: Brice Lecampion<br>Presenting Author: Brice Lecampion |
| | 955 | **Hydraulic fracturing in fully-saturated porous materials: Phase-field modelling and experimental validation**<br>Authors: Bernd Markert, Yousef Heider<br>Presenting Author: Bernd Markert |
| | 546 | **Methods for modelling the planar fractures**<br>Authors: Natalia Zavialova, Aleksandr Bikov, Ilia Perepechkin, Sergei Negodiaev<br>Presenting Author: Natalia Zavialova |
| | 1040 | **Poro-elastic coupling in processes of wellbore failure and hydraulic fracturing**<br>Authors: Sergey Golovin, Aleksei Baykin<br>Presenting Author: Sergey Golovin |
| | 823 | **Effect of dilatancy on the nucleation of dynamic rupture due to fluid injection**<br>Authors: Federico Ciardo, Brice Lecampion<br>Presenting Author: Federico Ciardo |

Lunch 12.15 - 13.45 - 1st floor

Poster Session 12.15 - 13.45 Ground floor

## 1-8 - Topology Optimization for Additive Manufacturing

Morning Session

DAY: Thursday

ROOM: Europa C

TIME 10.15-12.15

CHAIR: Can Ayas, Pierre Duysinx

**736** **Large-scale topology optimization for additive manufacturing using a virtual skeleton**

Authors: Yoram Mass, Oded Amir

Presenting Author: Yoram Mass

**839** **Imposing minimum gap in topology optimization through maximum size constraints: powder-removal-adapted designs**

Authors: Eduardo Fernández, Maxime Collet, Pablo Alarcon, Simon Bauduin, Pierre Duysinx

Presenting Author: Pierre Duysinx

**689** **Topology optimization with overhang filter considering accessibility of supports**

Authors: Emiel van de Ven, Matthijs Langelaar, Can Ayas, Robert Maas, Fred van Keulen

Presenting Author: Emiel van de Ven

**831** **Controlling local overheating in additive manufacturing parts using topology optimization**

Authors: Rajit Ranjan, Yabin Yang, Can Ayas, Matthijs Langelaar, Fred Van Keulen

Presenting Author: Rajit Ranjan

**1423** **Multi-material continuum topology optimization with arbitrary volume and mass constraints**

Authors: Emily Sanders, Miguel Aguilo, Glaucio Paulino

Presenting Author: Emily Sanders

**697** **Optimal structures of multilateral composites**

Authors: Andrej Cherkaev, Grzegorz Dzierzanowskii

Presenting Author: Andrej Cherkaev

Lunch 12.15 - 13.45 - 1st floor

Poster Session 12.15 - 13.45 Ground floor

## 9-3 - Variational Methods in Constitutive Modelling for Multi-physics Problems

Morning Session

DAY: Thursday

ROOM: Indaco

TIME 10.15-12.15

CHAIR: Kerstin Weinberg, Marcello Vasta

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| **KEYNOTE** | **830** | **Seismic attenuation and velocity dispersion in random fracture networks**<br>Authors: Marco Favino, Jürg Hunziker, Klaus Holliger, Rolf Krause<br>Presenting Author: Marco Favino |
| **INVITED** | **1008** | **The Schwarz Alternating Method for Concurrent Multiscale in Finite Deformation Solid Mechanics**<br>Authors: Alejandro Mota, Irina Tezaur, Coleman Alleman<br>Presenting Author: Alejandro Mota |
| **INVITED** | **655** | **A novel FSI framework based on the variational IB Method**<br>Authors: Dr. Maria Giuseppina Chiara Nestola, Barna Becsek, Hadi Zolfaghari, Prof. Dominik Obrist, Prof. Dr. Rolf Krause<br>Presenting Author: Maria Giuseppina Chiara Nestola |
| **INVITED** | **1329** | **A coupled approach for diffused fracturing in porous brittle materials**<br>Authors: Gianluca Caramiello, Andrea Montanino, Gabriele Della Vecchia, Anna Pandolfi<br>Presenting Author: Andrea Montanino |
| **INVITED** | **668** | **Modelling the coupling between plastic activity and allotropic transformation in iron**<br>Authors: Nicolas Bruzy, Michel Coret, Bertrand Huneau, Laurent Stainier<br>Presenting Author: Laurent Stainier |

Lunch 12.15 - 13.45 - 1st floor

Poster Session 12.15 - 13.45 Ground floor

**GS-3 Computational Mechanics** Morning Session

DAY: Thursday

ROOM: Rossa A

TIME 10.15-12.15

CHAIR: Foucault de Francqueville, Bobby Huxford

**904** **Representative volume elements for the finite element simulation of isotropic composites highly filled with monosized spheres**

Authors: Foucault de Francqueville, Julie Diani, Pierre Gilormini, Aude Vandenbroucke

Presenting Author: Foucault de Francqueville

**1035** **Continuum modelling of extrinsic toughening and fibre bridging**

Authors: Bobby Huxford, Benjamin P. Russell, William Ronan

Presenting Author: Bobby Huxford

**1050** **Anisotropic crack path prediction in polycrystalline materials using graph theoretic approaches**

Authors: Siddhartha Srivastava, Veera Sundararaghavan

Presenting Author: Siddhartha Srivastava

**1073** **Functional approach to error control and adaptive algorithms for Reissner-Mindlin plates**

Authors: Maksim Frolov, Olga Chistiakova

Presenting Author: Maksim Frolov

**1153** **Nonlinear Finite Element Implementation of Invariant Free Hyperelasticity**

Authors: Daniel O'Shea, David Kellermann, Mario Attard

Presenting Author: Daniel O'Shea

Lunch 12.15 - 13.45 - 1st floor

Poster Session 12.15 - 13.45 Ground floor

**2-3 - Mechanics of Silk: from Molecules to Orb-webs** Morning Session

DAY: Thursday

ROOM: Rossa B

TIME 10.15-12.15

CHAIR: Frauke Graeter, Nicola M. Pugno

**1497** **Silk as a Functional Component in Strong Flexible Bionanocomposites**

Authors: Vladimir Tsukruk

Presenting Author: Vladimir Tsukruk

**1521** **A mechanical method to increase the toughness performances of silk fibers**

Authors: Alice Berardo, Maria Pantano, Nicola M. Pugno

Presenting Author: Maria Pantano

**1523** **Spiders web: an example of structure composed by multi-functional materials.**

Authors: Gabriele Greco, Barbara Mazzolani, Nicola M. Pugno

Presenting Author: Gabriele Greco

**1524** **Weibull statistics applied to spider silk.**

Authors: Gabriele Greco, Barbara Mazzolani, Nicola M. Pugno

Presenting Author: Gabriele Greco

**1525** **Spider weight dragging and lifting mechanics**

Authors: Nicola M. Pugno

Presenting Author: Nicola M. Pugno

Lunch 12.15 - 13.45 - 1st floor

Poster Session 12.15 - 13.45 Ground floor

**GS-5 Dynamics, Waves and Metamaterials** Morning Session

DAY: Thursday

ROOM: Verde A

TIME 10.15-12.15

CHAIR: Annamaria Pau, Robert Davey

**905 The role of the strain energy order in the model of prestressed plates in acoustoelastic theory**

Authors: Annamaria Pau, Fabrizio Vestroni

Presenting Author: Annamaria Pau

**908 Validation and analysis of bird substitute impact on Hopkinson tube**

Authors: Jesus Pernas-Sanchez, Jose Alfonso Artero-Guerrero, David Varas, Jorge Lopez-Puente

Presenting Author: Jesus Pernas-Sanchez

**933 An Efficient Semi-Analytical Scheme for Determining the Scattering of Lamb Waves in a Wave-Guide with Discontinuous Depth**

Authors: Robert Davey, Raphael Assier, David Abrahams, Rich Hewitt

Presenting Author: Robert Davey

**1297 Stochastic response of uncertain-but-bounded linear fractional dynamical systems**

Authors: Giulio Cottone, Roberta Santoro

Presenting Author: Roberta Santoro

**1336 GRIN metalenses for shear-polarized surface waves**

Authors: Antonio Palermo, Farhad Zeighami, Alessandro Marzani

Presenting Author: Farhad Zeighami

Lunch 12.15 - 13.45 - 1st floor

Poster Session 12.15 - 13.45 Ground floor

**2-6 - Mechanics of Mineralised Tissue and Biomaterials** Morning Session

DAY: Thursday

ROOM: Verde B

TIME 10:15 - 12:15

CHAIR: Anna Tampieri, Marco Viceconti

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| **KEYNOTE** | **519** | **A multiscale model of the skeleton to predict the absolute risk of femoral neck fracture**<br>Authors: Marco Viceconti, Sachin Prabhu H. R., Pinaki Bhattacharya<br>Presenting Author: Marco Viceconti |
| **INVITED** | **292** | **Multifaceted experimental approach to investigate the biomechanics of the natural, diseased and treated vertebrae**<br>Authors: Luca Cristofolini<br>Presenting Author: Luca Cristofolini |
| | **253** | **Mathematical Modeling of technologies for the design of innovative functional bio-coatings for dental implants**<br>Authors: Alla Balueva, Ilia Dashevskiy<br>Presenting Author: Alla Balueva |
| | **738** | **Femur mechanics via a CT-based computational model accounting for bone non-linear constitutive response**<br>Authors: Cristina Falcinelli, Alessio Gizzi, Alberto Di Martino, Giuseppe Vairo<br>Presenting Author: Cristina Falcinelli |
| | **855** | **Bamboo: Evolutionally perfected damage tolerant structural material**<br>Authors: Sayaad Mannan, Venkitanarayanan Parameshwaran, Sumit Basu<br>Presenting Author: Sumit Basu |

Lunch 12.15 - 13.45 - 1st floor

Poster Session 12.15 - 13.45 Ground floor

**3-5 - Mechanics and Physics of Solids and Structures** Morning Session

DAY: Thursday

ROOM: Italia

TIME 10.15-12.15

CHAIR: D. Vella, F. Bosi

**1271** **Biological and bio-inspired motility at microscopic scales: locomotion by shape control**

Authors: Antonio DeSimone, Marino Arroyo, Giovanni Noselli

Presenting Author: Antonio DeSimone

**630** **Dragonfly-inspired deployable structures: how to inflate and stay flat?**

Authors: Joel Marthelot, P.-T. Brun

Presenting Author: P.-T. Brun

**642** **Swimming through buckling**

Authors: Adel Djellouli, Philippe Marmottant, Henda Djeridi, Catherine Quilliet, Gwennou Coupier

Presenting Author: Catherine Quilliet

**869** **Morphorods: instabilities and pattern formation in growing elastic rods**

Authors: Derek Moulton, Alain Goriely, Thomas Lessinnes

Presenting Author: Derek Moulton

**702** **Shear visco-elasticity of hydrogels**

Authors: Mattia Bacca, Robert McMeeking

Presenting Author: Mattia Bacca

**776** **Bouncing, screaming, floating: motion control with vaporizing soft solids**

Authors: Scott Waitukaitis, Martin van Hecke

Presenting Author: Scott Waitukaitis

Lunch 12.15 - 13.45 - 1st floor

Poster Session 12.15 - 13.45 Ground floor

**3-1 - Contact Mechanics** Morning Session

DAY: Thursday

ROOM: Europa Auditorium

TIME 10.15 -12.15

CHAIR: Michel Raous, Zoe Clark

**821** **Atomic interaction based continuum models for adhesion, chemical bonding and frictional contac**

Authors: Thang Duong, Roger Sauer

Presenting Author: Roger A. Sauer

**1392** **Alternative Treatment of Large Deformation Contact using VEM**

Authors: Peter Wriggers, Wilhelm Rust

Presenting Author: Peter Wriggers

**1406** **Numerical modeling of the debonding process of mixed-mode composite double cantilever beams**

Authors: Rossana Dimitri, Giorgio Zavarise

Presenting Author: Rossana Dimitri

**1457** **A non-local fractional-order interface mechanical model**

Authors: Gioacchino Alotta, Rossana Dimitri, Francesco Paolo Pinnola, Giorgio Zavarise, Massimiliano Zingales

Presenting Author: Francesco Paolo Pinnola

**199** **An accelerated Uzawa method for frictionless contact problems**

Authors: Yoshihiro Kanno

Presenting Author: Yoshihiro Kanno

Lunch 12.15 - 13.45 - 1st floor

Poster Session 12.15 - 13.45 Ground floor

## 3-10 - Mechanics of Generalized Continua with - Mechanics of Cohesion-adhesion Interactions and their Applications to Sizedependent Thin Structures

Morning Session

DAY: Thursday

ROOM: Celeste

TIME 10.15-12.15

CHAIR: Chairman Sergey Lurie, Chairman Yuriy Povstenko

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| **KEYNOTE** | **393** | **Interpretation of Nanoindentation Tests Using Mechanics of Adhesive Contact**<br>Authors: Feodor M. Borodich, Boris A. Galanov<br>Presenting Author: Feodor M. Borodich |
| **INVITED** | **1436** | **Stress fields in an elastic cylinder with a long polygonal prismatic inclusion subjected to dilatational eigenstrain**<br>Authors: Stanislav Krasnitckii, Andrey Smirnov, Mikhail Gutkin<br>Presenting Author: Stanislav Krasnitckii |
| | **1029** | **Surface elasticity effect on diffusional growth of surface defects in strained solids**<br>Authors: Gleb M. Shuvalov, Sergey A. Kostyrko<br>Presenting Author: Gleb M. Shuvalov |
| | **417** | **General approach to some problems of nanomechanics**<br>Authors: Mikhail Grekov<br>Presenting Author: Mikhail Grekov |

Lunch 12.15 - 13.45 - 1st floor

Poster Session 12.15 - 13.45 Ground floor

**6-1 -Nonlinear Dynamics in Mechanical and Structural Systems** Morning Session

DAY: Thursday

ROOM: Magenta A

TIME 10.15-12.15

CHAIR: Harry Dankowicz, Katica Hedrih

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| **KEYNOTE** | **1166** | **Identification of nonlinear modes based on normal form and experimental continuation. Application to the acoustics of chinese gongs**<br>Authors: Olivier Thomas, Vivien Denis, Marguerite Jossic, Christophe Giraud-Audine, Baptiste Chomette, Adrien Mamou-Mani<br>Presenting Author: Olivier Thomas |
| | **213** | **Non-linear vibration modes of beams and cables on elastic media subjected to linearly varying normal forces**<br>Authors: Carlos Mazzilli, Eduardo Ribeiro, Stefano Lenci, Lucio Demeio<br>Presenting Author: Carlos Mazzilli |
| | **1389** | **Nonlinear parametric modeling of compression roller batteries and experimental validation**<br>Authors: Andrea Arena, Biagio Carboni, Walter Lacarbonara<br>Presenting Author: Andrea Arena |
| | **205** | **On the coupling between axial and transversal vibration in a rectilinear Euler-Bernoulli beam**<br>Authors: Stefano Lenci, Francesco Clementi<br>Presenting Author: Stefano Lenci |
| | **528** | **Motion Control of a Flexible Underactuated Manipulator by Utilizing of Resonance of a Flexible Arm**<br>Authors: Satoshi Kobayashi, Hiroshi Yabuno<br>Presenting Author: Satoshi Kobayashi |

Lunch 12.15 - 13.45 - 1st floor

Poster Session 12.15 - 13.45 Ground floor

**3-7 - Nonlinear Elasticity** Morning Session

DAY: Thursday

ROOM: Magenta B

TIME 10.15-12.15

CHAIR: Luis Dorfmann, Xiaoyu Luo

**1478** **Spatially resolved distortions in growing media**

Authors: Alfio Grillo, Salvatore Di Stefano, Ariel Ramirez-Torres, Raimondo Penta

Presenting Author: Alfio Grillo

**1149** **Discrete-to-continuum modelling of cells to tissue**

Authors: Nicholas Hill, Roxanna Barry, Peter Stewart

Presenting Author: Nicholas Hill

**805** **Modeling bone remodeling based on chemical affinity tensor**

Authors: Yanina Izmaylova, Alexander Freidin

Presenting Author: Yanina Izmaylova

**734** **Compatible Morphing and the Heart Function**

Authors: Stefano Gabriele, Paola Nardinocchi, Luciano Teresi, Valerio Varano

Presenting Author: Luciano Teresi

Lunch 12.15 - 13.45 - 1st floor

Poster Session 12.15 - 13.45 Ground floor

**Poster Session** Morning Session

DAY: Thursday

ROOM: Poster Area - Ground Floor

TIME 12.15-13.45

**437 Flow investigation in a horizontal chemical vapour deposition chamber with a heated substrate**

Authors: Ming-Han Hsieh, Yao-Hsien Liu, Chih-Yung Huang

Presenting Author: Chih-Yung Huang

**475 Numerical analysis and experimental validation of forming tool module with variable stiffness blank-holder**

Authors: Nuno Peixinho, Sérgio Costa, Vitor Blanco

Presenting Author: Nuno Peixinho

**580 Evaluation of the elastic stiffnesses of multi-directional laminates by bending tests**

Authors: Paolo Fisicaro, Paolo S. Valvo, Claudia Borri

Presenting Author: Paolo Fisicaro

**1100 Mechanical characterization of Italian bamboo**

Authors: Marco Fabiani, Lando Mentrasti, Silvia Greco, Luisa Molari, Lorenzo Bar

Presenting Author: Luisa Molari

**1332 A computational study of the ballistic performance of UHMW-PE composites: looking beyond fibre properties**

Authors: R. Varun Raj, R.H.J Peerlings, Vikram Deshpande

Presenting Author: R. Varun Raj

**1366 Characterizing the pyroelectric coefficient for macro-fiber composites**

Authors: Krystal Acosta, William Wilkie, Daniel Inman

Presenting Author: Krystal Acosta

**1391 The application of model of nonlinear oscillations to hemodynamics**

Authors: Nikita Denisenko, Alexander Cherevko, Alexander Khe, Daniil Parshin, Alexander Chupakhin

Presenting Author: Nikita Denisenko

**1395 Study on the damage evolution equation and spallation of metal**

Authors: Jiedong Cao

Presenting Author: Jiedong Cao

**1429** **Some problems of mathematical modelling of anterior abdominal wall in the context of repair of hernia**

Authors: Izabela Lubowiecka, Katarzyna Szepietowska

Presenting Author: Izabela Lubowiecka

**1451** **Modification of the creep behavior of an oxidized titanium alloy. Experiments and modeling**

Authors: Dominique Poquillon, Coralie Parrens

Presenting Author: Dominique Poquillon

**1500** **A length-dependent characteristics of fundamental vibration mode of Aβ intermediate oligomer**

Authors: Hyunsung Choi, Sungsoo Na

Presenting Author: Hyunsung Choi

**1540** **Effects of minimal surface on mechanical properties of 3D shell architectures**

Authors: Anna Na, Seung Chul Han, Kiju Kang

Presenting Author: Anna Na

**1541** **A very thin sandwich panel of monolithic foil**

Authors: Yoon Chang Jeong, Dae Han Choi, Kiju Kang

Presenting Author: Yoon Chang Jeong

**Poster Session** Morning Session

DAY: Thursday

ROOM: Poster Area - Ground Floor

TIME 12.15-13.45

**1542 Design of Shellular pressure vessel**

Authors: Cheng Han Wu, Kiju Kang

Presenting Author: Cheng Han Wu

**1544 An auxetic material composed of 3D shell architectures**

Authors: Seung Chul Han, Yoon Chang Jeong, Anna Na, Kiju Kang

Presenting Author: Seung Chul Han

**1545 Behaviour of silica Shellular under internal or external hydrostatic pressure**

Authors: Tatiana Kolesnikova, Kiju Kang

Presenting Author: Tatiana Kolesnikova

**1546 A new design of a polymer electrolyte membrane fuel cell with a 3D architectured membrane electrodes assembly**

Authors: Hoang Xuan Nguyen, Kiju Kang

Presenting Author: Xuan Hoang Nguyen

**1553 Artificial spider silk production on a microfluidic chip**

Authors: Nathalie Gonska, Nathaniel D. Robinson, Laurent Barbe, Maria Tenje, Jan Johansson, Anna Rising

Presenting Author: Nathalie Gonska

**1563 An evaluation of the Gent and Gent-Gent material models using inflation of a plane membrane**

Authors: Lei Zhou, Shibin Wang, Linan Li, Yibin Fu

Presenting Author: Zhou Lei

**1566 Dispersion, localization and standing modes of in-plane Floquet-Bloch waves in Rayleigh beam lattices**

Authors: Giovanni Bordiga, Luigi Cabras, Andrea Piccolroaz

Presenting Author: Giovanni Bordiga

**1567 Meta-structural plates for the cloaking of flexural waves**

Authors: Marco Rossi, Daniele Veber, Massimiliano Gei

Presenting Author: Marco Rossi

**1571 Peridynamics of thin films undergoing through thickness delamination**

Authors: Riccardo Cavuto, Kaushik Dayal, Luca Deseri

Presenting Author: Riccardo Cavuto

**1572 Frictional properties of viscoelastic materials at high sliding velocities**

Authors: Elena Missale, Gianluca Costagliola, Federico Bosia, Nicola M. Pugno

Presenting Author: Elena Missale

**1573 Leaning masonry structures: An efficient procedure for the stability analysis**

Authors: Antonio Maria D'Altri, Gabriele Milani, Stefano de Miranda, Giovanni Castellazzi, Vasilis Sarhosis

Presenting Author: Antonio Maria D'Altri

**1574 Stag beetle elytra: localized shape-retaining, puncture and wear-resistant**

Authors: Lakshminath Kundanati, Roberto Guarino, Nicola Maria Pugno

Presenting Author: Lakshminath Kundanati

**1575 Dielectric elastomer driven resonating inchworm-like robot with unidirectional claws**

Authors: Luigi Calabrese, Massimiliano Gei, Danilo De Rossi, Nicola Maria Pugno, Gualtiero Fantoni

Presenting Author: Luigi Calabrese

**Plenary Lecture** Afternoon Session

DAY: Thursday

ROOM: Europa Auditorium

TIME 13.45-14.30

CHAIR: John Hutchinson

**Solid mechanics on a chip**

Thomas Pardoen

## 3-9 - The Physics of Dense Granular Media

Afternoon Session

DAY: Thursday

ROOM: Cobalto

TIME 14:30 - 16:30

CHAIR: Kondic, Kamrin

**284** **Stress anisotropy in quasi-statically sheared granular packings**

Authors: Corey OHern, Sheng Chen, Weiwei Jin, Thibault Bertrand, Mark Shattuck

Presenting Author: Corey OHern

**414** **Shear-induced transitions in dry grains and suspensions**

Authors: Bulbul Chakraborty

Presenting Author: Bulbul Chakraborty

**532** **Jamming with cohesion: A sticky problem**

Authors: Brian Tighe

Presenting Author: Brian Tighe

**714** **Size Segregation in an Erodible Bed under Shear Flow**

Authors: Nicholas Ouellette, Marios Galanis

Presenting Author: Nicholas Ouellette

**804** **Deformation of a 3D granular media caused by fluid invasion**

Authors: Marie-Julie Dalbe, Ruben Juanes

Presenting Author: Marie-Julie Dalbe

**390** **Force networks in granular systems in stick-slip regime**

Authors: Lou Kondic, Chao Cheng, Lenka Kovalcinova, Miroslav Kramar, Konstantin Mischaikow

Presenting Author: Lou Kondic

Coffee Break 16.30-17.00 - Ground floor and 1st floor

**2-4 - Mechanics of Soft Biological Tissues** Afternoon Session

DAY: Thursday

ROOM: Ciano A

TIME 14.30-16.30

CHAIR: Bram Trachet, Osman Gültekin

| | | |
|---|---|---|
| KEYNOTE | 1017 | **Synchrotron-based pressure inflation to characterize the unfolding of aortic lamellae in mouse carotid arteries**<br>Authors: Bram Trachet, Mauro Ferraro, Lydia Aslanidou, Patrick Segers, Nikos Stergiopulos<br>Presenting Author: Bram Trachet |
| | 1248 | **Biomechanical properties of human subclavian and iliac arteries subjected to extension, inflation and torsion**<br>Authors: Gerhard Sommer, Gloria Hohenberger, Tina U. Cohnert, Gerhard A. Holzapfel<br>Presenting Author: Gerhard Sommer |
| | 1437 | **Wall shear stress as a regulator of cerebral artery diameter**<br>Authors: Shin-ichiro Sugiyama, Teiji Tominaga, Makoto Ohta<br>Presenting Author: Shin-ichiro Sugiyama |
| | 1353 | **Anisotropic Growth of Arterial Walls During the Restenosis Process**<br>Authors: Xuyan Liu, Behrooz Fereidoonnezhad, Bjørn Skallerud, Gerhard Holzapfel<br>Presenting Author: Xuyan, Liu |
| | 1232 | **A Phase-field Approach to Model Aortic Dissections**<br>Authors: Osman Gültekin, Hüsnü Dal, Gerhard A. Holzapfel<br>Presenting Author: Osman Gültekin |

Coffee Break 16.30-17.00 - Ground floor and 1st floor

## 1-9 - Modeling of Fracture in Hard and Sof materials

Afternoon Session

DAY: Thursday

ROOM: Ciano B

TIME 14:30-16:30

CHAIR: David Kammer, Mikhail Perelmuter

| | | |
|---|---|---|
| **INVITED** | **333** | **Multiscale Damage Models for Composite Laminates**<br>Authors: Su Zhoucheng, Jerry Quek, Brian Cox, Sridhar Narayanaswamy<br>Presenting Author: Sridhar Narayanaswamy |
| **INVITED** | **1292** | **The role of friction in the 3ENF and 4ENF delamination tests: an analytical solution**<br>Authors: Francesco Parrinello, Guido Borino<br>Presenting Author: Francesco Parrinello |
| **INVITED** | **431** | **Fracture modeling of adhesive connection by an imperfect soft interface model**<br>Authors: Francesco Ascione, Marco Lamberti, Frédéric Lebon, Aurélien Maurel-Pantel, Maria Letizia Raffa<br>Presenting Author: Francesco Ascione |
| | **1140** | **Influence of shear on interface fracture of sandwich beams**<br>Authors: Roberta Massabò, Luca Barbieri<br>Presenting Author: Roberta Massabò |
| | **833** | **Evaluation of facesheet-to-core interface strength in sandwich panels in the dynamic debonding propagation analysis**<br>Authors: Vyacheslav Burlayenko, Tomasz Sadowski, Svetlana Dimitrova<br>Presenting Author: Vyacheslav Burlayenko |
| | **1250** | **Crack front fingering in failure of heterogeneous brittle solids**<br>Authors: Manish Vasoya, Véronique Lazarus, Laurent Ponson<br>Presenting Author: Laurent Ponson |

Coffee Break 16.30-17.00 - Ground floor and 1st floor

**6-2 - Elastic Metamaterials** Afternoon Session

DAY: Thursday

ROOM: Bianca A

TIME 14.30-16.30

CHAIR: Prof. A.B. Movchan, Dr. D. Misseroni

| | |
|---|---|
| **1512** | **Universality of the Frequency Spectrum of Laminates**<br>Authors: Ben Lustig, Gal Shmuel<br>Presenting Author: Gal Shmuel |
| **189** | **How to advantageously manage the ellipticity of Rayleigh waves in artificially structured soils?**<br>Authors: Stephane Brulé, Stefan Enoch, Sebastien Guenneau<br>Presenting Author: Stephane Brulé |
| **1407** | **Can one reproduce a "gyrobeam" with a chiral elastic structure?**<br>Authors: Michael Nieves, Giorgio Carta, Ian Jones, Natasha Movchan, Alexander Movchan<br>Presenting Author: Michael Nieves |
| **699** | **Porous mechanical metamaterials as aggregates of elastic charges**<br>Authors: Gabriele Librandi, Michael Moshe, Yoav Lahini, Katia Bertoldi<br>Presenting Author: Gabriele Librandi |
| **343** | **Dispersion and band-gaps in micromorphic media and metamaterials**<br>Authors: Angela Madeo, Marco Valerio d'Agostino, Alexios Aivaliotis, Gabriele Barbagallo, Patrizio Neff<br>Presenting Author: Angela Madeo |
| **950** | **The fluid-loaded metawedge: Converting flexural waves into sound**<br>Authors: E. A. Skelton, R. V. Craster, A. Colombi, D. J. Colquitt<br>Presenting Author: Dr Daniel J Colquitt |

Coffee Break 16.30-17.00 - Ground floor and 1st floor

## 1-1 - Mechanics of Composite Materials

Afternoon Session

DAY: Thursday

ROOM: Bianca B

TIME 14.30-16.30

CHAIR: Pedro Camanho, Josep Costa

**991** **A 3D tomographic investigation to elucidate how thin-ply laminates improve the interlaminar shear strength and the effect of toughening the interfaces with veils**

Authors: Santiago García Rodríguez, Josep Costa Balanzat, Vicky Singery, Aravind Sasikumar

Presenting Author: Santiago García Rodríguez

**1014** **An isotropic damage cohesive model for mixed-mode delamination with large openings and fiber bridging**

Authors: Federica Confalonieri, Umberto Perego

Presenting Author: Federica Confalonieri

**1075** **Guided Wave Techniques for Damage Detection and Property Characterization in Composite Aerospace Structures**

Authors: Margherita Capriotti, Ranting Cui, Francesco Lanza di Scalea

Presenting Author: Francesco Lanza di Scalea

**1085** **Measuring the delamination fracture toughness of cylindrical specimens via the Double Drum Peel (DDP): a new test concept**

Authors: Federica Daghia, Christophe Cluzel, Louis Hébrard, François Churlaud, Benoît Courtemanche

Presenting Author: Federica Daghia

**1117** **Modelling of an epoxy matrix based on the shear transformation zone framework**

Authors: Jérémy Chevalier, Xavier Morelle, Pedro Camanho, Frédéric Lani, Thomas Pardoen

Presenting Author: Jérémy Chevalier

**1229** **Mathematical simulation of a rigid indenter interaction with a layered composite system considering viscoelasticity**

Authors: Valentin Mozharovsky, Natalya Maryina, Dmitry Kuzmenkov

Presenting Author: Valentin Mozharovsky

Coffee Break 16.30-17.00 - Ground floor and 1st floor

## 8-2 -Computational Homogenization of Nonlinear Composites

Afternoon Session

DAY: Thursday

ROOM: Europa A

TIME 14.30-16.30

CHAIR: Felix Fritzen, Stefanie Reese

| | | |
|---|---|---|
| KEYNOTE | 725 | **Nonlinear compressive failure analysis of unidirectional fiber reinforced composite materials**<br>Authors: Domenico Bruno, Fabrizio Greco, Raimondo Luciano, Paolo Nevone Blasi, Andrea Pranno<br>Presenting Author: Fabrizio Greco |
| | 648 | **Strength properties of nanoporous materials: Molecular Dynamics simulations and Limit Analysis homogenization**<br>Authors: Giuseppe Vairo, Stella Brach, Kokou Anoukou, Djimedo Kondo<br>Presenting Author: Giuseppe Vairo |
| | 1198 | **Multiscale modeling of the out-of-plane response of masonry walls**<br>Authors: Daniela Addessi, Elio Sacco, Paolo Di Re<br>Presenting Author: Daniela Addessi |
| | 1397 | **Advancements on the FE·Meshless CH for the analysis of heterogeneous periodic materials**<br>Authors: Emma La Malfa Ribolla, Antonino Spada, Giuseppe Giambanco<br>Presenting Author: Emma La Malfa Ribolla |
| | 838 | **A simple Cosserat Finite Element for masonry modelled by discrete elements**<br>Authors: Daniele Baraldi, Antonella Cecchi<br>Presenting Author: Daniele Baraldi |

Coffee Break 16.30-17.00 - Ground floor and 1st floor

**3-6 - Multi-Physics of Solids at Fracture** Afternoon Session

DAY: Thursday

ROOM: Europa B

TIME 14.30-16.30

CHAIR: A. Linkov, B. Merkert

**1095 A dynamical interpretation of the fracking by the Statistical Central Force Model**

Authors: Pietro Favia, Carlo Peruzzo, Francesco Pesavento, Bernhard A. Schrefler

Presenting Author: Carlo Peruzzo

**201 Water-Induced Failure Mechanics for Concrete: Micro-Mechanical Model, Experimental Observation and Phase-field coupling**

Authors: Fadi Aldakheel, Peter Wriggers

Presenting Author: Fadi Aldakheel

**243 Penny-shaped hydraulic fracture accounting for shear stress induced by the fluid**

Authors: Daniel Peck, Michal Wrobel, Gennady Mishuris

Presenting Author: Daniel Peck

**853 Redirection of a crack driven by viscous fluid**

Authors: Monika Perkowska, Andrea Piccolroaz, Michal Wrobel, Gennady Mishuris

Presenting Author: Gennady Mishuris

**385 Singular crack-tip plastic fields in non-associative solids**

Authors: Panos Papanastasiou, David Durban

Presenting Author: Panos Papanastasiou

Coffee Break 16.30-17.00 - Ground floor and 1st floor

**1-8 - Topology Optimization for Additive Manufacturing** Afternoon Session

DAY: Thursday

ROOM: Europa C

TIME 14:30-16:30

CHAIR: Pierre Duysinx, Can Ayas

**457** **Mechanical failure of wall structures in 3D printing processes**

Authors: Akke Suiker

Presenting Author: Akke Suiker

**1443** **The design of a lattice-based periodic microstructure model towards 3D printable optimized structures**

Authors: Chikwesiri Imediegwu

Presenting Author: Chikwesiri Imediegwu

**1241** **Generative Design of Lightweight Lattice Structures in Autodesk Nastran**

Authors: David Weinberg, Nam-Ho Kim, Kosala Bandara

Presenting Author: David Weinberg

**824** **Design for additive manufacturing with distortion constraints**

Authors: Grzegorz Misiun, Emiel van den Ven, Can Ayas, Matthijs Langelaar, Bert Geijselaers, Ton van den Boogaard, Fred van Keulen

Presenting Author: Grzegorz Misiun

**732** **Topology optimization of 2.5D parts using the SIMP method with a variable thickness approach**

Authors: Volkan Kandemir, Oguz Dogan, Ulas Yaman

Presenting Author: Volkan Kandemir

**286** **Robust topology optimization of phononic crystals considering material properties uncertainty during manufacturing process**

Authors: Xiaopeng Zhang, Akihiro Takezawa, Zhan Kang

Presenting Author: Xiaopeng Zhang

Coffee Break 16.30-17.00 - Ground floor and 1st floor

## 9-3 - Variational Methods in Constitutive Modelling for Multi-physics Problems

Afternoon Session

DAY: Thursday

ROOM: Indaco

TIME 14:30-16:30

CHAIR: Anna Pandolfi, Laurent Stainier

| | | |
|---|---|---|
| **INVITED** | **861** | **A constitutive model of anode charging and discharging in lithium-ion batteries**<br>Authors: Kerstin Weinberg, Marek Werner<br>Presenting Author: Kerstin Weinberg |
| **INVITED** | **1413** | **A Variational Framework for Thermo-Mechanics of Gradient-Extended Dissipative Solids**<br>Authors: Stephan Teichtmeister, Aref Nateghi, Marc-André Keip<br>Presenting Author: Stephan Teichtmeister |
| **INVITED** | **1493** | **A visco-hyperelastic model based on variational constitutive updates including coupled mechanical-chemical degradation**<br>Authors: Vinícius Rios Fuck, Paulo Bastos de Castro, Jan-Michel Colombo Farias, Eduardo Alberto Fancello<br>Presenting Author: Eduardo Alberto Fancello |
| **INVITED** | **1382** | **The microstructure evolution caused by the strain-induced crystallization in polymers**<br>Authors: Sandra Klinge, Serhat Aygün<br>Presenting Author: Sandra Klinge |
| **INVITED** | **808** | **Onsager's variational principle to model soft and biological matter**<br>Authors: Nikhil Walani, Alejandro Torres Sanchez, Dimitri Kaurin, Caterina Tozzi, Sohan Kale, Marino Arroyo<br>Presenting Author: Nikhil Walani |
| **INVITED** | **435** | **Theoretical and computational modeling of hyperelastic fiber-reinforced soft materials via a multivariate statistical approach**<br>Authors: Marcello Vasta, Alessio Gizzi, Anna Pandolfi<br>Presenting Author: Marcello Vasta |

Coffee Break 16.30-17.00 - Ground floor and 1st floor

**GS-3 Computational Mechanics** Afternoon Session

DAY: Thursday

ROOM: Rossa A

TIME 14.30-16.30

CHAIR: Ulrike Zwiers, Daniel Riddoch

**1156 Reviewing the Lagrangian formulation of dynamical models with a pure-rolling constraint**

Authors: Ulrike Zwiers

Presenting Author: Ulrike Zwiers

**1318 Atomic basis functions in computational modelling of engineering problems by solution structure method**

Authors: Vedrana Kozulić, Blaž Gotovac

Presenting Author: Vedrana Kozulić

**1507 Response of a mass-spring system under coulomb damping and harmonic base excitation**

Authors: Daniel Riddoch, Alice Cicirello, David Hills

Presenting Author: Daniel Riddoch

**1511 Modeling indentation of monazite single crystals using a new numerical framework**

Authors: Kristian Juul, Christopher Nellemann, Kim Nielsen, Christian Niordson, Jeffrey Kysar

Presenting Author: Kristian Juul

Coffee Break 16.30-17.00 - Ground floor and 1st floor

**GS-5 Dynamics, Waves and Metamaterials** Afternoon Session

DAY: Thursday

ROOM: Verde A

TIME 14.30-16.30

CHAIR: Antonio Palermo, Lucchesi Massimiliano

**1396 Dynamics of Rayleigh-like waves in granular media coupled with resonant metasurfaces**

Authors: Antonio Palermo, Sebastian Krödel, Kathryn H. Matlack, Rachele Zaccherini, Vasilis K. Dertimanis, Eleni N. Chatzi, Alessandro Marzani, Chiara Daraio

Presenting Author: Antonio Palermo

**1483 Study of wave propagation in periodic arrangements of slender beams rigidly joined to a thin plate**

Authors: Oscar Serrano, Ramon Zaera, Jose Fernandez-Saez

Presenting Author: Oscar Serrano

**1496 The generalized density evolution equation for the dynamic analysis of slender masonry structures**

Authors: Barbara Pintucchi, Massimiliano Lucchesi, Nicola Zani

Presenting Author: Lucchesi Massimiliano

**1257 Green's Tensors of Motion Equations of Two-Components Biot's Media**

Authors: Lyudmila Alexeyeva, Yergali Kurmanov

Presenting Author: Yergali Kurmanov

**1535 Singular boundary integral equations of boundary value problems of the dynamics of elastic mediums**

Authors: Lyudmila Alexayeva, Zakiryanova Gulmira

Presenting Author: Lyudmila Alexeyeva

Coffee Break 16.30-17.00 - Ground floor and 1st floor

**3-5 - Mechanics and Physics of Solids and Structures** Afternoon Session

DAY: Thursday

ROOM: Italia

TIME 14.30-16.30

CHAIR: A. DeSimone, M. Dias

| | |
|---|---|
| **756** | **Elastocapillary contact between droplets and highly bendable membranes**<br>Authors: Dominic Vella, Thomas Chandler, Benny Davidovitch<br>Presenting Author: Dominic Vella |
| **1146** | **Elasto-capillarity for the creation of liquid-solid fibers and membranes**<br>Authors: Paul Grandgeorge, Aurélie Hourlier-Fargette, Sébastien Neukirch, Natacha Krins, Arnaud Antkowiak<br>Presenting Author: Paul Grandgeorge |
| **1009** | **Reconfigurable Textures by Dynamic Elastocapillary Self-Assembly**<br>Authors: Sameh Tawfick<br>Presenting Author: Sameh Tawfick |
| **643** | **Passive Elastic Structure Interacting with Grains in Motion**<br>Authors: Martin Brandenbourger, Alex Hindelang, Wyatt Perry, Douglas Holmes<br>Presenting Author: Martin Brandenbourger |
| **416** | **Surface Elasticity of Strained Soft Solids**<br>Authors: Qin Xu, Robert Style, Eric Dufresne<br>Presenting Author: Qin Xu |
| **450** | **Partial wetting of a highly bendable sheet**<br>Authors: Fabian Brau, S. Ganga Prasath, Benny Davidovitch<br>Presenting Author: Fabian Brau |

Coffee Break 16.30-17.00 - Ground floor and 1st floor

**3-1 - Contact Mechanics** Afternoon Session

DAY: Thursday

ROOM: Europa Auditorium

TIME 14:30 - 16:30

CHAIR: Roger Sauer, Rossana Dimitri

**1341** **Indentation of thin adhesive beams**

Authors: S. Krishnan, Ishan Sharma, Sovan Das

Presenting Author: S. Krishnan

**290** **Axisymmetric finite element model for the analysis of heat dynamics of friction and wear during repeated braking**

Authors: Aleksander Yevtushenko, Piotr Grzes

Presenting Author: Piotr Grzes

**329** **Some observations in the asymptotic analysis of PCMI problem**

Authors: Hyung-Kyu Kim

Presenting Author: Hyung-Kyu Kim

**1291** **A mixed BEM-asperity model to predict pull-off force of fractal surfaces**

Authors: Guido Violano, Giuseppe Demelio, Luciano Afferrante

Presenting Author: Guido Violano

**1491** **Boundary element approaches to contact mechanics of viscoelastic rough surfaces**

Authors: Carmine Putignano, Giuseppe Carbone

Presenting Author: Carmine Putignano

**817** **Approximate closed-form solution to Hertzian indentation of an elastic half-plane with surface tensions**

Authors: Jing Jin Shen

Presenting Author: Jing Jin Shen

Coffee Break 16.30-17.00 - Ground floor and 1st floor

**3-10 - Mechanics of Generalized Continua with - Mechanics of Cohesion-adhesion Interactions and their Applications to Sizedependent Thin Structures**

Afternoon Session

DAY: Thursday

ROOM: Celeste

TIME 14.30-16.30

CHAIR: Chairman Feodor M.Borodich, Chairman Yury Solyaev

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|---|---|---|
| **INVITED** | **1080** | **On revision of bending theories of size-dependent elastic hyperfine systems across length scales of gradient and adhesive nature**<br>Authors: Sergey Lurie<br>Presenting Author: Sergey Lurie |
| **INVITED** | **162** | **Fractional heat conduction in solids connected by thin intermediate layer: nonperfect thermal contact**<br>Authors: Yuriy Povstenko, Tamara Kyrylych<br>Presenting Author: Yuriy Povstenko |
| | **1012** | **Stress concentration analysis of nanosized thin film coating with rough interface**<br>Authors: Sergey Kostyrko, Mikhail Grekov, Holm Altenbach<br>Presenting Author: Sergey Kostyrko |
| **INVITED** | **735** | **The Effect of Inclusion on Plate Buckling under Tension**<br>Authors: Nikita Morozov, Svetlana Bauer, Stanislava Kashtanova, Boris Semenov<br>Presenting Author: Staislava Kashtanova |
| | **924** | **Elastic second-strain gradient Euler-Bernoulli cantilever beams**<br>Authors: Fabien Amiot<br>Presenting Author: Fabien Amiot |
| | **218** | **Stability and Stiffness Properties of a Nanoplate in the Strain-Consistent Elastic Model with Surface Stresses**<br>Authors: Anatolii Bochkarev<br>Presenting Author: Anatolii Bochkarev |

Coffee Break 16.30-17.00 - Ground floor and 1st floor

## 6-1 -Nonlinear Dynamics in Mechanical and Structural Systems

Afternoon Session

DAY: Thursday

ROOM: Magenta A

TIME 14.30-16.30

CHAIR: Marcelo Savi, Dmitry Indeitsev

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|---|---|---|
| KEYNOTE | 700 | **The spatio-temporal bifurcation structure in magnetic resonance force microscopy**<br>Authors: Oded Gottlieb, Evyatar Hacker<br>Presenting Author: Oded Gottlieb |
| | 752 | **Thermal Effects on Dynamic of Circular Cylindrical Shell**<br>Authors: Antonio Zippo, Francesco Pellicano<br>Presenting Author: Francesco Pellicano |
| | 957 | **Dynamic regimes in nonlinearly coupled electromechanical system**<br>Authors: Valeria Settimi, Francesco Romeo<br>Presenting Author: Valeria Settimi |
| | 451 | **Nonlinear behaviour of a three-dimensional multiphysics beam under parametric excitation and internal resonances**<br>Author: Vinciane Guillot, Alireza Ture Savadkoohi, Claude-Henry Lamarque<br>Presenting Author: Vinciane Guillot |
| | 780 | **Calibrated model of flexible structure VIVs**<br>Authors: Victoria Kurushina, Ekaterina Pavlovskaia, Marian Wiercigroch<br>Presenting Author: Victoria Kurushina |

Coffee Break 16.30-17.00 - Ground floor and 1st floor

**3-7 - Nonlinear Elasticity** Afternoon Session

DAY: Thursday

ROOM: Magenta B

TIME 14.30-16.30

CHAIR: Nicholas Hill, Luis Dorfmann

**512 Wrinkle-ridge-sagging transitions in soft shells sliding on rigid cylinders**

Authors: Fan Xu, Yifan Yang, Hui-Hui Dai

Presenting Author: Fan Xu

**897 Homogenized mechanical behavior of two-phase neo-Hookean laminates: Macroscopic instabilities and post-bifurcation response**

Authors: Joshua Furer, Pedro Ponte Castañeda

Presenting Author: Pedro Ponte Castañeda

**1079 Multiscale homogenization of active nonlinear elastic composites**

Authors: Ariel Ramirez-Torres, Raimondo Penta, Alfio Grillo, Reinaldo Rodriguez-Ramos, Josè Merodio

Presenting Author: Raimondo Penta

**399 On the dynamic dilatation of a compressible Rivlin's cube beyond its elastic limit**

Authors: Kostas Soldatos

Presenting Author: Kostas Soldatos

**896 The constitutive relations of initially stressed incompressible Mooney- Rivlin materials**

Authors: Abramo Agosti, Artur L. Gower, Pasquale Ciarletta

Presenting Author: Abramo Agosti

**1376 An invariant-free formulation of anisotropic hyperelasticity**

Authors: David Kellermann, Mario Attard

Presenting Author: David Kellermann

Coffee Break 16.30-17.00 - Ground floor and 1st floor

## 3-9 - The Physics of Dense Granular Media

Evening Session

DAY: Thursday

ROOM: Cobalto

TIME 17:00 - 19:00

CHAIR: Shattuck, Menon

**326** **Critical scaling of granular materials near the yielding transition**

Authors: Abram Clark

Presenting Author: Abram Clark

**224** **Granular flows through an orifice: Can one unclog a hopper by gently shaking the grains?**

Authors: Alexandre Nicolas, Angel Garcimartin, Iker Zuriguel

Presenting Author: Alexandre Nicolas

**518** **Looking inside granular jumps down inclines thanks to dynamic X-ray radiography**

Authors: Ségolène Méjean, François Guillard, Thierry Faug, Itai Einav

Presenting Author: Ségolène Méjean

**562** **Granular flow in confined geometries: jamming, clogging, and instability**

Authors: Ko Okumura

Presenting Author: Ko Okumura

**866** **Size segregation fluxes in oscillating shear cells**

Authors: Tomas Trewhela, Christophe Ancey, John Mark Nicholas Timm Gray

Presenting Author: Tomas Trewhela

**722** **Structure of cohesive frictional granular materials**

Authors: Saurabh Singh, John C. Miers, Christopher J. Saldana, Tejas G. Murthy

Presenting Author: Tejas G. Murthy

Conference Dinner 20.00 - Palazzo Re Enzo

**2-4 - Mechanics of Soft Biological Tissues** Evening Session

DAY: Thursday

ROOM: Ciano A

TIME 17.00-19.00

CHAIR: Patrick McGarry, Gerhard Sommer

**1370 Viscoelastic Modeling of the Passive Myocardium**

Authors: Gerhard A. Holzapfel, Osman Gültekin, Gerhard Sommer

Presenting Author: Gerhard A. Holzapfel

**1175 A Micro-structural Model of the Ventricular Myocardium**

Authors: Eoin McEvoy, Patrick McGarry

Presenting Author: Patrick McGarry

**985 Understanding the frequency response of the myocardial tissue using rheology and MR-Elastography**

Authors: Myrianthi Hadjicharalambous, Gerhard Sommer, Adela Capilnasiu, Ayse Sila Dokumaci, Daniel Fovargue, Ralph Sinkus, Gerhard Holzapfel, David Nordsletten

Presenting Author: Myrianthi Hadjicharalambous

**670 Dynamic depth-controlled indentation mapping reveals regional variations of viscoelastic properties in mouse hippocampal tissue**

Authors: Nelda Antonovaite, Steven V. Beekmans, Wytse J. Wadman, Elly M. Hol, Davide Iannuzzi

Presenting Author: Nelda Antonovaite

**335 Functional Optimality of Sulcus Pattern Formations**

Authors: Stefanie Heyden, Michael Ortiz

Presenting Author: Stefanie Heyden

**889 A computational platform for the personalized clinical treatment of glioblastoma multiforme**

Authors: Abramo Agosti, Clara Cattaneo, Chiara Giverso, Davide Ambrosi, Pasquale Ciarletta

Presenting Author: Pasquale Ciarletta

Conference Dinner 20.00 - Palazzo Re Enzo

**7-2 - Steel Structures: Mechanics, Simulation and Testing** Evening Session

DAY: Thursday

ROOM: Ciano B

TIME 17.00-19.00

CHAIR: Leroy Gardner, Nuno Silvestre

| | | |
|---|---|---|
| **KEYNOTE** | **1304** | **The mechanics of open built-up sections**<br>Authors: Kim Rasmussen<br>Presenting Author: Kim Rasmussen |
| | **1300** | **Tapered mono-symmetric thin-walled beams: critical issues in the evaluation of cross-section resistance.**<br>Authors: Giuseppe Balduzzi, Elio Sacco, Ferdinando Auricchio, Josef Füssl<br>Presenting Author: Giuseppe Balduzzi |
| | **995** | **Towards a refined description of the plastic buckling problem of a cylindrical shell under axial compression**<br>Authors: Jean Legendre, Philippe Le Grognec, Cédric Doudard, Sylvain Moyne<br>Presenting Author: Philippe Le Grognec |
| | **671** | **Service behaviour of slim floor beams: an experimental study**<br>Authors: Nadia Baldassino, Giacomo Roverso, Gianluca Ranzi, Riccardo Zandonini<br>Presenting Author: Gianluca Ranzi |
| | **1565** | **Behaviors of circular steel tube confined reinforced concrete columns at elevated temperatures and after exposure**<br>Authors: Hua Yang, Faqi Liu, Sumei Zhang<br>Presenting Author: Hua Yang |

Conference Dinner 20.00 - Palazzo Re Enzo

**6-2 - Elastic Metamaterials** Evening Session

DAY: Thursday

ROOM: Bianca A

TIME 17.00-19.00

CHAIR:Prof. S. Guenneau, Prof. A.B. Movchan

**209** **Shear wave propagation and band gaps in finitely deformed layered dielectric elastomers**

Authors: Pavel I. Galich, Stephan Rudykh

Presenting Author: Pavel I. Galich

**693** **Observation of topologically protected helical edge states in an elastic waveguide**

Authors: Marco Miniaci, Raj Kumar Pal, Bruno Morvan, Massimo Ruzzene

Presenting Author: Marco Miniaci

**191** **Dissipative elastic metamaterials: when and how viscoelasticity matters**

Authors: Anastasiia O. Krushynska, Antonio S. Gliozzi, Federico Bosia, Simone Ghio, Marco Scalerandi, Nicola M. Pugno

Presenting Author: Anastasiia O. Krushynska

**342** **Transparent relaxed micromorphic description of anisotropy in meta-materials**

Authors: Marco Valerio d'Agostino, Alexios Aivaliotis, Gabriele Barbagallo, Patrizio Neff, Angela Madeo

Presenting Author: Marco Valerio d'Agostino

**835** **Metamaterial devices for nonlinear elastic wave applications**

Authors: Federico Bosia, Antonio Gliozzi, Marco Miniaci, Anastasiia Krushynska, Marco Scalerandi, Bruno Morvan, Nicola M. Pugno

Presenting Author: Federico Bosia

**1028** **Invisibility cloak for structured plates**

Authors: Diego Misseroni, Alexander B. Movchan, Natasha V. Movchan, Ian S. Jones, Daniel J. Colquitt

Presenting Author: Diego Misseroni

Conference Dinner 20.00 - Palazzo Re Enzo

**1-1 - Mechanics of Composite Materials** Evening Session

DAY: Thursday

ROOM: Bianca B

TIME 17.00-19.00

CHAIR: Pedro Camanho, Josep Costa

**1246** **Numerical analysis and strength prediction of thin-ply composites**

Authors: Albertino Arteiro, Pedro P. Camanho

Presenting Author: Albertino Arteiro

**1390** **Modeling Fiber Kinking and Debonding in Fiber Reinforced Composites using Geometrically Nonlinear Cohesive Elements**

Authors: Samira Hosseini, Stefan Löhnert, Peter Wriggers

Presenting Author: Samira Hosseini

**1419** **Deformation and failure of brittle heterogeneous honeycomb solids**

Authors: Deepak Kumar, Anuradha Banerjee

Presenting Author: Deepak Kumar

Conference Dinner 20.00 - Palazzo Re Enzo

**8-2 -Computational Homogenization of Nonlinear Composites** Evening Session

DAY: Thursday

ROOM: Europa A

TIME 17.00-19.00

CHAIR: Sonia Marfia, Giuseppe Vairo

**454** **Crimped fibers in microstructured soft materials: theoretical and computational modelling of flexible composites**

Authors: Michele Marino, Peter Wriggers

Presenting Author: Michele Marino

**931** **Short Fiber Reinforced Thermoplastic Composite Modelling using Full Field Computing, Application to Glass Fiber Reinforced PEEK**

Authors: Boris Burgarella, Aurélien Maurel-Pantel, Noel Lahellec, Jean-Luc Bouvard, Noelle Billon

Presenting Author: Aurélien Maurel-Pantel

**569** **An incremental variational procedure for elasto-plastic composites with combined isotropic and linear kinematic hardening**

Authors: Antoine Lucchetta, François Auslender, Michel Bornert, Djimédo Kondo

Presenting Author: Antoine Lucchetta

**970** **Homogenization estimates for the time harmonic response of particulate composites with a fractional viscoelastic matrix**

Authors: Valentin Gallican, Renald Brenner

Presenting Author: Valentin Gallican

**370** **Effect of heterogeneity on the elastic-plastic transition and the operation of the transformation toughening mechanism**

Authors: Catalin Picu, Stefan Sorohan, Vineet Negi, Zehai Wang, Dan Constantinescu

Presenting Author: Catalin Picu

**366** **Automatic derivation of material laws for simulating structrual components**

Authors: Matthias Kabel, Jonathan Köbler

Presenting Author: Matthias Kabel

Conference Dinner 20.00 - Palazzo Re Enzo

## 3-6 - Multi-Physics of Solids at Fracture

Evening Session

DAY: Thursday

ROOM: Europa B

TIME 17.00-19.00

CHAIR: B. Schlefler, G. Mishuris

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|---|---|---|
| **KEYNOTE** | **1554** | **Modeling multi-scale processes in hydraulic fracture propagation**<br>Authors: Anthony Peirce<br>Presenting Author: Anthony Peirce |
| | **1452** | **A numerical perspective of cohesive zone models for the simulation of hydraulic fracture propagation**<br>Authors: Lorenzo Benedetti, Dong Liu, Brice Lecampion<br>Presenting Author: Lorenzo Benedetti |
| | **438** | **Finite element modelling of hydraulic fracture processes using quasi-zero-thickness interface elements**<br>Authors: Ignasi de-Pouplana, Eugenio Oñate<br>Presenting Author: Ignasi de-Pouplana |
| | **1233** | **Early-time solution for a leak-off dominated hydraulic fracture**<br>Authors: Bin Chen, D. Roger J. Owen, Chenfeng Li<br>Presenting Author: Chenfeng Li |
| | **239** | **A novel explicit method for simulation of hydraulic fractures**<br>Authors: Aleksandr Linkov, Alexey Stepanov<br>Presenting Author: Aleksandr Linkov |

Conference Dinner 20.00 - Palazzo Re Enzo

**1-8 - Topology Optimization for Additive Manufacturing** Evening Session

DAY: Thursday

ROOM: Europa C

TIME 17.00-19.00

CHAIR: Pierre Duysinx, Can Ayas

**490** **Combined topology and layer-wise scanning direction optimization for minimum part distortion in selective laser melting**

Authors: Dirk Munro, Can Ayas, Matthijs Langelaar, Fred van Keulen

Presenting Author: Dirk Munro

**1462** **On topology optimization of periodic multi-material viscoelastic microstructures using a fractional viscoelastic material model**

Authors: Oliver Giraldo-Londono, Glaucio H. Paulino

Presenting Author: Oliver Giraldo-Londono

Conference Dinner 20.00 - Palazzo Re Enzo

## 9-1 - Multi-scale Solids and Homogenization

Evening Session

DAY: Thursday

ROOM: Indaco

TIME 17.00-19.00

CHAIR: Natasha Movchan, Daniel Colquitt

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| **KEYNOTE** | **708** | **Exact relations for Green's functions in linear PDE and boundary field equalities: a generalization of conservation laws**<br>Authors: Graeme Milton, Daniel Onofrei<br>Presenting Author: Graeme W. Milton |
| **INVITED** | **745** | **Homogenisation of chains involving inertial amplification**<br>Authors: Luke Bennetts, Malte Peter, Paul Dylejko, Alex Skvortsov<br>Presenting Author: Luke Bennetts |
| **INVITED** | **222** | **Waves in slowly varying band-gap media: Method of matched multiple-scale asymptotic expansions**<br>Authors: Ory Schnitzer<br>Presenting Author: Ory Schnitzer |
| | **1529** | **Dance of the crawling waves: dynamic homogenization at finite wavelengths and finite frequencies**<br>Authors: Bojan Guzina, Shixu Meng, Othman Oudghiri-Idrissi<br>Presenting Author: Bojan B. Guzina |
| **INVITED** | **572** | **High-frequency homogenisation and applications to experiments on elastic plates**<br>Authors: G. Lefebvre, T. Antonakakis, Y. Achaoui, R. Craster, S. Guenneau, P. Sebbah<br>Presenting Author: Richard Craster |

Conference Dinner 20.00 - Palazzo Re Enzo

**5-5 - Non-local Models for Damage and Fracture** Evening Session

DAY: Thursday

ROOM: Rossa A

TIME 17.00-19.00

CHAIR: Ugo Galvanetto, Erkan Oterkus

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| KEYNOTE | 707 | **Crack-path instabilities in glass as a way of determining the peridynamic horizon size in thermally-driven fracture**<br>Authors: Florin Bobaru, Zhanping Xu, Guanfeng Zhang, Ziguang Chen<br>Presenting Author: Florin Bobaru |
| | 313 | **An energy based peridynamic state-based failure criterion**<br>Authors: Christian Willberg, Lasse Wiedemann, Martin Rädel<br>Presenting Author: Christian Willberg |
| | 336 | **Quasi-static crack propagation problems solved with a sequentially linear approach**<br>Authors: Mirco Zaccariotto, Tao Ni, Ugo Galvanetto<br>Presenting Author: Mirco Zaccariotto |
| | 323 | **Applying a variable grid size to a Peridynamic model**<br>Authors: Arman Shojaei, Farshid Mossaiby, Mirco Zaccariotto, Ugo Galvanetto<br>Presenting Author: Arman Shojaei |
| | 962 | **Spectral methods for peridynamic models**<br>Authors: Bacim Alali, Nathan Albin<br>Presenting Author: Bacim Alali |

Conference Dinner 20.00 - Palazzo Re Enzo

**7-5 - New Concepts for Advanced Materials and Structures** Evening Session

DAY: Thursday

ROOM: Rossa B

TIME 17.00-19.00

CHAIR: Michele Brun, Vincent Pagneux

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| **KEYNOTE** | **883** | **Nonlinear elastic waves in architected auxetic soft solids**<br>Authors: Tournat Vincent, Deng Bolei, Raney Jordan R., Bertoldi Katia<br>Presenting Author: Vincent TOURNAT |
| **INVITED** | **591** | **Wave propagation and topological modes in quasiperiodic elastic media**<br>Authors: Raj Kumar Pal, Massimo Ruzzene<br>Presenting Author: Massimo Ruzzene |
| **INVITED** | **993** | **Topological rotational waves in mechanical granular graphene**<br>Authors: Li-Yang Zheng, Georgios Theocharis, Vincent Tournat, Vitalyi Gusev<br>Presenting Author: Li-Yang Zheng |
| **INVITED** | **611** | **Polarization Control of Elastic Waves with Metamaterials**<br>Authors: Guancong Ma<br>Presenting Author: Guancong Ma |
| **INVITED** | **1549** | **Parity-Time Synthetic Phononic Media and non-Hermitian Valley Transport**<br>Authors: Johan Christensen<br>Presenting Author: Johan Christensen |

Conference Dinner 20.00 - Palazzo Re Enzo

**6-4 - Nonlinear waves in solids** Evening Session

DAY: Thursday

ROOM: Verde A

TIME 17.00-19.00

CHAIR: Alexey Porubov, Vladimir Erofeev

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| KEYNOTE | 548 | **Weakly-nonlinear approach to scattering of solitons by delamination**<br>Authors: Karima Khusnutdinova, Matthew Tranter<br>Presenting Author: Karima Khusnutdinova |
| | 603 | **Detecting delamination with the help of solitons**<br>Authors: Matthew Tranter, Karima Khusnutdinova<br>Presenting Author: Matthew Tranter |
| | 216 | **Solitary waves modelled by the Boussinesq-type equations and the importance of inertia**<br>Authors: Tanel Peets, Kert Tamm, Jüri Engelbrecht<br>Presenting Author: Tanel Peets |
| | 567 | **Inelastic interaction and splitting of strain solitons propagating in a rod**<br>Authors: Vladimir Erofeev, Vladimir Kazhaev, Igor Pavlov, Alexey Malkhanov<br>Presenting Author: Vladimir Erofeev |
| | 659 | **Nonlinear Surface Waves in a Half Space Covered by an Uneven Layer**<br>Authors: Mevlut Teymur, Ekin Deliktas<br>Presenting Author: Mevlut Teymur |

Conference Dinner 20.00 - Palazzo Re Enzo

## 1-2 - The Virtual Concrete Lab: Modelling the Behaviour of Concrete from Fresh State to Long Term Durability

Evening Session

DAY: Thursday

ROOM: Verde B

TIME 17.00-19.00

CHAIR: Günter Hofstetter, Liberato Ferrara

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| KEYNOTE | 872 | **A multiscale framework for the behavior of concrete at earl-age**<br>Authors: Madura Pathirage, Gianluca Cusatis, Giovanni Di Luzio, Enrico Masoero<br>Presenting Author: Giovanni Di Luzio |
| | 570 | **From experimental investigations to numerical modelling of shotcrete**<br>Authors: Matthias Neuner, Magdalena Schreter, Tobias Corder, Günter Hofstetter<br>Presenting Author: Matthias Neuner |
| | 581 | **A comparison of fully coupled multi-phase creep formulations for young shotcrete**<br>Authors: Peter Gamnitzer, Matthias Neuner, Günter Hofstetter<br>Presenting Author: Peter Gamnitzer |
| | 930 | **Preliminary study of the fiber distribution in fiber reinforced concrete through computational fluid dynamics model**<br>Authors: Massimiliano Cremonesi, Liberato Ferrara<br>Presenting Author: Massimiliano Cremonesi |
| | 978 | **Computational simulation of fiber distribution and orientation during casting of fiber reinforced cementitious materials**<br>Authors: Vladislav Gudzulic, Rodolfo Williams, Günther Meschke<br>Presenting Author: Rodolfo Williams |
| | 1207 | **Modelling chemical transport in cementitious media**<br>Authors: Brubeck Freeman, Peter Cleall, Anthony Jefferson<br>Presenting Author: Brubeck Freeman |

Conference Dinner 20.00 - Palazzo Re Enzo

**3-5 - Mechanics and Physics of Solids and Structures** Evening Session

DAY: Thursday

ROOM: Italia

TIME 17.00-19.00

CHAIR F. Brau, S. Rudykh

**1020** **Peristaltic elastic instability in an inflated cylindrical channel**

Authors: Nontawit Cheewaruangroj, John Biggins

Presenting Author: Nontawit Cheewaruangroj

**598** **On the stability of soft incompressible spheres with residual stresses**

Authors: Davide Riccobelli, Pasquale Ciarletta

Presenting Author: Davide Riccobelli

**758** **Cusp-shaped elastic creases and furrows**

Authors: Anupam Pandey, Stefan Karpitschka, Jens Eggers, Jacco Snoeijer

Presenting Author: Anupam Pandey

**682** **Bifurcation of coated deformable stuctures under finite bending: a novel method to estimate mechanical properties of nanocrystal films**

Authors: Mayank Sinha, Alborz Izadi, Rebecca Anthony, Sara Roccabianca

Presenting Author: Mayank Sinha

**726** **Spontaneous formation of hexagonal patterns in elastic layers subjected to a homogeneous volume force**

Authors: Serge Mora, Aditi Chakrabarti, Jean-Marc Fromental, Ty Phou, Franck Richard, Yves Pomeau, Basile Audoly

Presenting Author: Serge Mora

**992** **Pattern formation in curved film-substrate systems**

Authors: Michel Potier-Ferry, Fan Xu, Radhi Abdelmoula

Presenting Author: Michel Potier-Ferry

Conference Dinner 20.00 - Palazzo Re Enzo

**3-1 - Contact Mechanics** Evening Session

DAY: Thursday

ROOM: Europa Auditorium

TIME 17:00 - 19:00

CHAIR: Peter Wriggers, Mariana De Souza

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| **KEYNOTE** | **324** | **The use of dislocations to solve half-plane contact problems under normal load, tension and shear**<br>Authors: David Hills<br>Presenting Author: David Hills |
| | **737** | **A Comparative Study of the Process Zones At Crack Tips and at the Edges of Incomplete Contacts**<br>Authors: Zoe Clark, David Hills<br>Presenting Author: Zoe Clark |
| | **453** | **Regular roughness effect on additional compliance of contacting bodies**<br>Authors: Irina Goryacheva, Ivan Tsukanov<br>Presenting Author: Irina Goryacheva |
| | **305** | **A general procedure for solving half-plane partial slip contact problems**<br>Authors: David A. Hills, Rangarajan Ramesh<br>Presenting Author: David A. Hills |

Conference Dinner 20.00 - Palazzo Re Enzo

**3-10 - Mechanics of Generalized Continua with - Mechanics of Cohesion-adhesion Interactions and their Applications to Sizedependent Thin Structures**

Evening Session

DAY: Thursday

ROOM: Celeste

TIME 17.00-19.00

CHAIR: Chairman Feodor M.Borodich, Chairman Sergey Lurie

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| **KEYNOTE** | **800** | **On thermal processes in one-dimensional harmonic diatomic lattice**<br>Authors: Ekaterina Podolskaya, Anton Krivtsov, Denis Tsvetkov<br>Presenting Author: Ekaterina Podolskaya |
| **INVITED** | **1051** | **Delamination Modelling of Self-adhesive Polyethylene Films with Traction-separation Law and Digital Images of T-peeling**<br>Authors: Behnaz Bagheri, Stefan Schulze, Konstantin Naumenko, Holm Altenbach<br>Presenting Author: Behnaz Bagheri |
| | **447** | **Gradient elastic medium with surface energy: mathematical model and wave processes analysis**<br>Authors: Alexey Malkhanov, Vladimir Erofeev<br>Presenting Author: Alexey Malkhanov |
| | **1374** | **Thermal processes in a one- and two-dimensional crystal with regard for the nonlocality**<br>Authors: Olga Loboda, Anton Krivtsov<br>Presenting Author: Olga Loboda |
| | **1078** | **Energy oscillations in nonlinear one-dimensional crystal**<br>Authors: Maksim Simonov, Anton Krivtsov, Kristina Matsyuk<br>Presenting Author: Maksim Simonov |

Conference Dinner 20.00 - Palazzo Re Enzo

## 6-1 -Nonlinear Dynamics in Mechanical and Structural Systems

Evening Session

DAY: Thursday

ROOM: Magenta A

TIME 17.00-19.00

CHAIR: Marco Amabili, Carlos Mazzilli

**743** **Dynamic Instability of Viscoelastic Cylindrical Shells with Internal Flowing Fluid**

Authors: Zenon Del Prado, Paulo Gonçalves

Presenting Author: Zenon Del Prado

**1201** **Evaluation of dynamic integrity of trusses by a Monte Carlo method procedure**

Authors: Frederico Silva, Kaio Benedetti, Paulo Gonçalves

Presenting Author: Frederico Silva

**710** **Estimating bolt tightness from measured vibrations: Influence of boundary nonlinearity**

Authors: Si Mohamed Sah, Jon Juel Thomsen, Marie Brons, Alexander Fidlin, Dmitri Tcherniak

Presenting Author: Si Mohamed Sah

**231** **Experimental identification of constitutive laws for friction-induced vibration and stability analysis**

Authors: Alessandro Cabboi, Jim Woodhouse, Tore Butlin

Presenting Author: Alessandro Cabboi

**1119** **On the features of acoustic metamaterials with hyperelastic locally resonant inclusions**

Authors: Priscilla B. Silva, Varvara G. Kouznetsova, Michael J. Leamy, Marc G. D. Geers

Presenting Author: Priscilla B. Silva

**990** **A novel mechanical piezoelectric system for acoustic energy harvesting**

Authors: Valerio De Biagi, Fabio Bazzucchi

Presenting Author: Valerio De Biagi

Conference Dinner 20.00 - Palazzo Re Enzo

## ESMC 2018 - Friday, July 6, 2018

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|---|---|---|---|---|---|---|---|---|---|---|
| 8:30 | Registration | | | | | | | | | |
| 9:00 | Europa Auditorium - Solid Mechanics Prize<br>Erik van der Giessen (University of Groningen)<br>Chair: Alan Needleman | | | | | | | | | |
| 9:45 | Coffee Break | | | | | | | | | |
| | Room Cobalto | Room Ciano A | Room Ciano B | Room Gialla A | Room Gialla B | Room Bianca A | Room Bianca B | Room Europa A | Room Europa B | Room Europa C |
| 10:15 | 3-9<br>3-9 - The Physics of Dense Granular Media | 2-4<br>2-4- Mechanics of Soft Biological Tissues | 7-2<br>7-2 - Steel Structures: Mechanics, Simulation and Testing | | | 3-4<br>3-4 - Mechanics of Granular Media: Experiments, Theory and Modelling | 5-2<br>5-2 - Cohesive-zone Modelling – Advances and Challenges | 8-1<br>8-1 - Micromechanics-based Nonlocal Continuum Models | 3-6<br>3-6 - Multi-Physics of Solids at Fracture | 4-2<br>4-2 - In-situ Mechanical Characterization of Materials |
| 12:15 | Lunch | | | | | | | | | |
| | Room Cobalto | Room Ciano A | Room Ciano B | Room Gialla A | Room Gialla B | Room Bianca A | Room Bianca B | Room Europa A | Room Europa B | Room Europa C |
| 13:45 | | 2-4<br>2-4- Mechanics of Soft Biological Tissues | 7-2<br>7-2 - Steel Structures: Mechanics, Simulation and Testing | | | 3-4<br>3-4 - Mechanics of Granular Media: Experiments, Theory and Modelling | 5-2<br>5-2 - Cohesive-zone Modelling – Advances and Challenges | 8-1<br>8-1 - Micromechanics-based Nonlocal Continuum Models | 3-6<br>3-6 - Multi-Physics of Solids at Fracture | 4-2<br>4-2 - In-situ Mechanical Characterization of Materials |
| 15:45 | Closing Cerimony | | | | | | | | | |
| | GROUND FLOOR | | | | | | | | | |

Registration

Europa Auditorium - Solid Mechanics Prize
Erik van der Giessen (University of Groningen)
Chair: Alan Needleman

Coffee Break

| Room Indaco | Room Rossa A | Room Rossa B | Room Verde A | Room Verde B | Room Italia | Room Europa Auditorium | Room Celeste | Room Magenta A | Room Magenta B |
|---|---|---|---|---|---|---|---|---|---|
| 9-1<br>9-1 - Multi-scale Solids and Homogenization | 5-5<br>5-5 - Non-local Models for Damage and Fracture | 3-11<br>3-11 - Generalized Continua | 6-4<br>6-4 - Nonlinear waves in solids | | 3-5<br>3-5- Mechanics and Physics of Solids and Structures | 3-1<br>3-1 - Contact Mechanics | 3-10<br>3-10 - Mechanics of Generalized Continua with Cohesion-adhesion Interactions and their Applications to Size-dependent Thin Structures | | 7-5<br>7-5 - New Concepts for Advanced Materials and Structures |

Lunch

| Room Indaco | Room Rossa A | Room Rossa B | Room Verde A | Room Verde B | Room Italia | Room Europa Auditorium | Room Celeste | Room Magenta A | Room Magenta B |
|---|---|---|---|---|---|---|---|---|---|
| 9-1<br>9-1 - Multi-scale Solids and Homogenization | 5-5<br>5-5 - Non-local Models for Damage and Fracture | 3-11<br>3-11 - Generalized Continua | | | 3-5<br>3-5- Mechanics and Physics of Solids and Structures | | | | 7-5<br>7-5 - New Concepts for Advanced Materials and Structures |

Closing Cerimony

FIRST FLOOR | SECOND FLOOR

DAY: Friday, July 6, 2018 Morning Session

**Solid Mechanics Prize**

DAY: Friday

ROOM: Europa Auditorium

TIME 9.00-9.45

CHAIR: Alan Needleman

**Micromechanics and emergence in time**

Erik van der Giessen

Coffee Break 09.45-10.15 - Ground floor and 1st floor

**3-9 - The Physics of Dense Granular Media** Morning Session

DAY: Friday

ROOM: Cobalto

TIME 10.15-12.15

CHAIR: Maloney, Tighe

**306 Quantifying flow and stress in ice mélange, the world's largest granular material**

Authors: Justin Burton, Jason Amundson, Ryan Cassotto, Chin-Chang Kuo, Michael Dennin

Presenting Author: Justin C. Burton

**1362 Shear localization and effective wall friction in confined granular flows**

Authors: Riccardo Artoni, Patrick Richard

Presenting Author: Riccardo Artoni

**1359 Complex Dynamics of Granular Chains: from wave guiding (ordered) to localisation and chaos (disordered)**

Authors: Georgios Theocharis, Vassos Achilleos, Charalampos Skokos, Florian Allein, Vincent Tournat, Vitaliy Gusev

Presenting Author: Georgios Theocharis

**1350 Lower Limits of Shear Jamming**

Authors: Yiqiu Zhao, Jonathan Bares, Robert Behringer

Presenting Author: Yiqiu Zhao

Lunch 12.15 - 13.45 - 1st floor

## 2-4 - Mechanics of Soft Biological Tissues

Morning Session

DAY: Friday

ROOM: Ciano A

TIME 10.15-12.15

CHAIR: Christian J. Cyron, Edoardo Mazza

**458** **On the relation between microscale and macroscale in volumetric growth of soft biological tissues**

Authors: Christian J. Cyron, Fabian A. Braeu, Roland C. Aydin

Presenting Author: Christian J. Cyron

**514** **Interfibrillar and intramolecular damage accumulation causes fatigue of soft fibrous tissues: a multi-scale constitutive modeling approach**

Authors: Kevin Linka, Markus Hillgärtner, Mikhail Itskov

Presenting Author: Kevin Linka

**656** **Mechanical characterisation of very soft tissues at high strain rates and large deformation using micro-indentation**

Authors: David MacManus, Jeremiah Murphy, Michael Gilchrist

Presenting Author: David MacManus

**768** **Blood perfusion in a mathematical model of fibrotic liver tissue**

Authors: Maryam Argungu, Filippo Recrosi, Rodolfo Repetto, Jennifer Tweedy

Presenting Author: Filippo Recrosi

**771** **Impaired hemodynamics in the Lamina Cribrosa induced by large tissue deformations**

Authors: Filippo Recrosi, Amabile Tatone, Rodolfo Repetto, Giovanna Guidoboni

Presenting Author: Amabile Tatone

Lunch 12.15 - 13.45 - 1st floor

**7-2 - Steel Structures: Mechanics, Simulation and Testing** Morning Session

DAY: Friday

ROOM: Ciano B

TIME 10.15-12.15

CHAIR: Kim Rasmussen, Lin-hai Han

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|---|---|
| **1221** | **Elastic local buckling stresses for full structural steel cross-sections**<br>Authors: Leroy Gardner, Andreas Fieber, Lorenzo Macorini<br>Presenting Author: Leroy Gardner |
| **788** | **Imperfection sensitivity of rectangular hollow section struts subject to local-global mode interaction**<br>Authors: Ahmer Wadee, Jiajia Shen<br>Presenting Author: Ahmer Wadee |
| **1044** | **Spatial buckling of steel members – on the influence of torsional loads**<br>Authors: Markus Knobloch, Rebekka Winkler<br>Presenting Author: Markus Knobloch |
| **161** | **Analysis of buckling-restrained braces: results and open problems**<br>Authors: Francesco Genna<br>Presenting Author: Francesco Genna |
| **471** | **Buckling and Postbuckling of Cylindrical Panels for Steel Brigde Girders**<br>Authors: Nuno Silvestre, António P. C. Duarte, João Pedro Martins, Luis Simões da Silva<br>Presenting Author: Nuno Silvestre |

Lunch 12.15 - 13.45 - 1st floor

## 3-4 - Mechanics of Granular Media: Experiments, Theory and Modelling

Morning Session

DAY: Friday

ROOM: Bianca A

TIME 10.15-12.15

CHAIR: Alessandro Gajo, Ken Kamrin, Stefan Luding

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|---|---|---|
| KEYNOTE | 1530 | **Mechanics of Granular Media: Experiments, Theory and Modelling Organizers Intro: From particles to continuum theory and applications**<br>Authors: Alessandro Gajo, Ken Kamrin, Stefan Luding<br>Presenting Author: Ken Kamrin |
| | 1363 | **Multiple contact compression and fracture of grains**<br>Authors: Patrick Richard, Riccardo Artoni, Aurélien Neveu, Yannick Descantes<br>Presenting Author: Patrick Richard |
| | 1325 | **Multi-scale analysis of failure in highly porous cohesive granular materials**<br>Authors: Tijan Mede, Guillaume Chambon, Pascal Hagenmuller, François Nicot<br>Presenting Author: Tijan Mede |
| | 859 | **Rheology of Dense Granular Fluids: Theory & Experiment**<br>Authors: Till Kranz, Olfa Lopez, Matthias Sperl<br>Presenting Author: Till Kranz |
| | 424 | **Theory for the rheology of dense non-Browninan suspensions**<br>Authors: Hisao Hayakawa, Koshiro Suzuki<br>Presenting Author: Hisao Hayakawa |
| | 826 | **Dilation-driven secondary flows in sheared granular systems**<br>Authors: Peter Dsouza, KP Krishnaraj, Prabhu Nott<br>Presenting Author: Peter Dsouza |

Lunch 12.15 - 13.45 - 1st floor

**5-2 - Cohesive-zone Modelling – Advances and Challenges** Morning Session

DAY: Friday

ROOM: Bianca B

TIME 10.15-12.15

CHAIR: Albert Turón, Giulio Alfano, Bent F. Sørensen

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| KEYNOTE | 1306 | **Are mode II and mode III fracture energies real material properties? A response based on a 3D DCB FEA with frictional multiplane CZMs**<br>Authors: Roberto Serpieri, Elio Sacco<br>Presenting Author: Roberto Serpieri |
| | 462 | **Mixed-mode debonding of sandwich panels exhibiting fiber bridging**<br>Authors: Daniel Höwer, Bradley A. Lerch, Brett A. Bednarcyk, Evan J. Pineda, Stefanie Reese, Jaan-Willem Simon<br>Presenting Author: Daniel Höwer |
| | 1054 | **On characterising fracture resistance in mode-I delamination**<br>Authors: Leo Škec, Giulio Alfano, Gordan Jelenić<br>Presenting Author: Leo Škec |
| | 1211 | **Discontinuous cohesive laws for modelling mixed-mode delamination**<br>Authors: Paolo S. Valvo, Bent F. Sørensen<br>Presenting Author: Paolo S. Valvo |
| | 1313 | **Computational framework for analyzing size effects due to material interfaces**<br>Authors: Tim Heitbreder, Jörn Mosler<br>Presenting Author: Tim Heitbreder |

Lunch 12.15 - 13.45 - 1st floor

## 8-1 - Micromechanics-based Nonlocal Continuum Models

Morning Session

DAY: Friday

ROOM: Europa A

TIME 10.15-12.15

CHAIR: Lorenzo Bardella, Samuel Forest

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|---|---|---|
| **KEYNOTE** | **446** | **Some forms and properties of models of strain-gradient plasticity**<br>Authors: John Willis<br>Presenting Author: John Willis |
| **INVITED** | **310** | **Discontinuous grain-boundary slip interactions within a finite-deformation gradient crystal plasticity theory dependent on dislocation transport**<br>Authors: Hannes Erdle, Thomas Böhlke<br>Presenting Author: Hannes Erdle |
| **INVITED** | **449** | **A grain boundary model for gradient-extended geometrically nonlinear crystal plasticity**<br>Authors: Atefeh Alipour, Stephan Wulfinghoff, Stefanie Reese<br>Presenting Author: Atefeh Alipour |
| **INVITED** | **1442** | **A homogenized model for unidirectional composites accounting for fiber breakage and matrix plasticity at large deformations**<br>Authors: Konstantinos Poulios, Christian F. Niordson<br>Presenting Author: Konstantinos Poulios |
| | **584** | **On the mechanical response due to higher-order boundary conditions in distortion gradient plasticity based on dislocation density tensor**<br>Authors: Andrea Panteghini, Lorenzo Bardella<br>Presenting Author: Andrea Panteghini |

Lunch 12.15 - 13.45 - 1st floor

**3-6 - Multi-Physics of Solids at Fracture** Morning Session

DAY: Friday

ROOM: Europa B

TIME 10.15-12.15

CHAIR: A. Linkov, B. Markert

**816** **Modeling and computational homogenization of fluid transport in fractured porous media using a diffuse interface formulation**

Authors: Nele Pollmann, Ralf Jänicke, Fredrik Larsson, Kenneth Runesson

Presenting Author: Nele Pollmann

**1043** **A mini-frac analysis via the direct simulation of a hydraulic fracture in poroelastic medium**

Authors: Aleksei Baykin, Sergey Golovin, Ekaterina Lgotina

Presenting Author: Aleksei Baykin

**1063** **Numerical model reduction of pressure diffusion in fluid-saturated porous media with fractures**

Authors: Ralf Jänicke, Fredrik Larsson, Kenneth Runesson

Presenting Author: Ralf Jänicke

**1331** **Experimental and theoretical modelling of processes near producing wells; influence of elastic, strength and permeability anisotropy**

Authors: Vladimir Karev, Dmitry Klimov, Yuri Kovalenko, Konstantin Ustinov

Presenting Author: Konstantin Ustinov

**1094** **Influence of the stresses change on hydraulic fracture formation**

Authors: Sergey Turuntaev, Evgeny Zenchenko, Maria Trimonova, Petr Zenchenko, Nikolay Baryshnikov, Akbota Aigozhieva

Presenting Author: Sergey Turuntaev

Lunch 12.15 - 13.45 - 1st floor

## 4-2 - In situ Characterisation of materials

Morning Session

DAY: Friday

ROOM: Europa C

TIME 10.15-12.15

CHAIR: T. Pardoen, E. Maire

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| KEYNOTE | 868 | **In situ observation and analysis of sliding contact damage in thin films with low adhesion**<br>Authors: Davy Dalmas, Aymar Quarre de Boiry, Jean-Yvon Faou<br>Presenting Author: Davy Dalmas |
| | 483 | **Use of X-ray Tomography for the Study of Ductile Damage in Metals**<br>Authors: David Wilkinson, Javad Samei, Michael Nemcko, Arnaud Weck<br>Presenting Author: David Wilkinson |
| | 542 | **Experimental Orientation Density Functions of Twisted Filament Yarns**<br>Authors: Aurélien Sibellas, Damien Durville, Eric Marie, Jérôme Adrien<br>Presenting Author: Aurélien Sibellas |
| | 898 | **Observation of plastic deformation mechanisms of polycrystalline Al at room and elevated temperature by in-situ SEM experiments**<br>Authors: Alexandre El Sabbagh, Alexandre Dimanov, Jean Raphanel, Michel Bornert<br>Presenting Author: Alexandre El Sabbagh |

Lunch 12.15 - 13.45 - 1st floor

**9-1 - Multi-scale Solids and Homogenization** Morning Session

DAY: Friday

ROOM: Indaco

TIME 10.15-12.15

CHAIR: Natasha Movchan, Ross McPhedran

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|---|---|---|
| **INVITED** | **1223** | **Linking Scales in the Sea Ice System**<br>Authors: Kenneth Golden<br>Presenting Author: Kenneth Golden |
| **INVITED** | **1224** | **Bloch wave excitation at the edge of a periodic lattice**<br>Authors: Ian Thompson, Rachel Brougham<br>Presenting Author: Ian Thompson |
| | **1335** | **Multi-scale modelling of irreversible behaviour of fibre networks subjected to moisture cycles**<br>Authors: Priyam Samantray, Ron Peerlings, Marc Geers, Thierry J. Massart<br>Presenting Author: Priyam Samantray |
| **INVITED** | **1349** | **Floquet-Bloch waves in periodic networks of the Rayleigh beams**<br>Authors: Luigi Cabras, Andrea Piccolroaz, Alexander B. Movchan<br>Presenting Author: Luigi Cabras |
| **INVITED** | **683** | **Internal variables in homogenization of viscoelastic materials**<br>Authors: Elena Cherkaev<br>Presenting Author: Elena Cherkaev |
| **INVITED** | **204** | **Asymptotic analysis of 3D equations in non-local elasticity for thin plates**<br>Authors: Julius Kaplunov, Ludmila Prikazchikova<br>Presenting Author: Julius Kaplunov |

Lunch 12.15 - 13.45 - 1st floor

## 5-5 - Non-local Models for Damage and Fracture

Morning Session

DAY: Friday

ROOM: Rossa A

TIME 10.15-12.15

CHAIR: Erkan Oterkus, Ugo Galvanetto

**270** **Finite Element Implementation of Peridynamics**

Authors: Erkan Oterkus, Zhenghao Yang, Mingyang Li, Selda Oterkus

Presenting Author: Erkan Oterkus

**1129** **Higher order peridynamics of large deformation hyperelasticity**

Authors: Gábor Ladányi, Viktor Gonda

Presenting Author: Gábor Ladányi

**1315** **A gradient-enhanced damage model motivated by engineering approaches to ductile failure of steels**

Authors: Andreas Seupel, Meinhard Kuna

Presenting Author: Andreas Seupel

**987** **A gradient-extended anisotropic damage model with crack-closure utilizing a micromorphic approach**

Authors: Marek Fassin, Stephan Wulfinghoff, Stefanie Reese

Presenting Author: Marek Fassin

**1034** **Non-local interactions across damaged bands and near notches or free-edges in isotropic Eikonal Non-Local damage models**

Authors: Giuseppe Rastiello, Cédric Giry, Fabrice Gatuingt, Rodrigue Desmorat

Presenting Author: Giuseppe Rastiello

**320** **Simulation of two-dimensional sloshing phenomenon by Peridynamic differential operator mesh-free method**

Authors: Soheil Bazazzadeh, Arman Shojaei, Mirco Zaccariotto, Ugo Galvanetto

Presenting Author: Soheil Bazazzadeh

Lunch 12.15 - 13.45 - 1st floor

**3-11 - Generalized Continua** Morning Session

DAY: Friday

ROOM: Rossa B

TIME 10.15-12.15

CHAIR Giuseppe Rosi, Elena Grekova

**1345** **Interaction of shear cracks in couple stress elasticity**

Author: Panos Gourgiotis

Presenting Author: Panos Gourgiotis

**819** **Investigation of the mechanics of stretching- and bending-dominated truss lattices treated as generalized continua**

Authors: Raphael Glaesener, Greg Phlipot, Dennis Kochmann

Presenting Author: Raphael Glaesener

**381** **Analytical solutions for micropolar elastic rectangle**

Authors: Yuri Grigor'ev

Presenting Author: Yuri Grigor'ev

**798** **On exact dynamic continuity conditions in the theory of irregular shell structures reinforced by beams along junctions**

Authors: Violetta Konopińska-Zmysłowska

Presenting Author: Violetta Konopińska-Zmysłowska

**1266** **A study on Love-type wave and new type of dispersive wave propagation in irregular/imperfectly bonded micropolar layer over half-space**

Authors: Mriganka Shekhar Chaki, Sayantan Guha, Abhishek Kumar Singh

Presenting Author: Mriganka Shekhar Chaki

Lunch 12.15 - 13.45 - 1st floor

## 6-4 - Nonlinear waves in solids

Morning Session

DAY: Friday

ROOM: Verde A

TIME 10.15-12.15

CHAIR: Alexey Porubov, Karima Khusnutdinova

**480 Nonlinear Acoustic Wedge Waves**

Authors: Pavel D. Pupyrev, Alexey M. Lomonosov, Peter Hess, Elena S. Sokolova, Alexander S. Kovalev, Andreas P. Mayer

Presenting Author: Andreas Mayer

**427 On the Impact Response of a 1-D Chain Constructed From Masses and Bistable Springs**

Authors: Shmuel Katz, Sefi Givli

Presenting Author: Shmuel Katz

**1235 Effect of discrete breathers on energy flow in nonlinear chains**

Authors: Sergey Dmitriev, Daxing Xiong, Elena Korznikova

Presenting Author: Sergey Dmitriev

**1236 Influence of delocalized short wave modes on the nonlinear dynamics of graphene**

Authors: Elena Korznikova, Stepan Shcherbinin, George Chechin, Sergey Dmitriev

Presenting Author: Elena Korznikova

**935 Propagation of compaction waves in the open-cell copper foams**

Authors: Zdzislaw Nowak, Marcin Nowak, Ryszard Pecherski

Presenting Author: Zdzislaw Nowak

**378 Control of nonlinear waves in solids**

Authors: Alexey Porubov, Ilya Antonov, Roman Bondarenkov

Presenting Author: Alexey Porubov

Lunch 12.15 - 13.45 - 1st floor

**3-5 - Mechanics and Physics of Solids and Structures** Morning Session

DAY: Friday

ROOM: Italia

TIME 10.15-12.15

CHAIR: S. Patinet, G. Tomassetti

**432** **High–power mechanics in gel structures driven by physics**

Authors: Michele Curatolo, Paola Nardinocchi, Luciano Teresi

Presenting Author: Michele Curatolo

**636** **The Magnetostriction Tensor Using Walpole's Representation**

Authors: Salvatore Federico, Giancarlo Consolo, Giovanna Valenti

Presenting Author: Salvatore Federico

**848** **Two-field surface pattern control via marginally stable magnetorheo- logical elastomers**

Authors: Erato Psarra, Laurence Bodelot, Konstantinos Danas

Presenting Author: Erato Psarra

**504** **THE p-n junction under nonuniform strains: general theory and application to photovoltaics**

Authors: Laurent Guin, Michel Jabbour, Nicolas Triantafyllidis

Presenting Author: Nicolas Triantafyllidis

**969** **Disappearance of stretch-induced wrinkles of thin films: a pseudo-elastic model accounting for Mullins effect**

Authors: Andras A. Sipos, Eszter Feher, Timothy J. Healey

Presenting Author: Andras A. Sipos

**311** **Emergent Strain-Stiffening in Interlocked Granular Chains**

Authors: Paul Rambach, Denis Dumont, Maurine Houze, Thomas Salez, Sylvain Patinet, Pascal Damman

Presenting Author: Paul Rambach

Lunch 12.15 - 13.45 - 1st floor

**3-1 - Contact Mechanics** Morning Session

DAY: Friday

ROOM: Europa Auditorium

TIME 10.15-12.15

CHAIR: Irina Goryacheva, Carmine Putignano

**1427** **Frictional mechanical contact excited by random signals**

Authors: Vladislav Aleshin, Antonio Papangelo, Michele Ciavarella

Presenting Author: Vladislav Aleshin

**912** **Real contact area reduction under shear and the value of static friction**

Authors: Julien Scheibert, Riad Sahli, Gaël Pallares, Christophe Ducottet, Imed Eddine Ben Ali, Samer Al Akhrass, Matthieu Guibert

Presenting Author: Julien Scheibert

**874** **Onset of frictional sliding in patterned interfaces**

Authors: Mariana De Souza, Davy Dalmas, Julien Scheibert

Presenting Author: Mariana De Souza

**460** **Axisymmetric Cracks in a Half-Space**

Authors: Jhonatan Da Ponte Lopes, David Hills

Presenting Author: Jhonatan Lopes

**1398** **Effect of interfacial tangential tractions on contact area in adhesive sliding contacts**

Authors: Nicola Menga, Giuseppe Carbone, Daniele Dini

Presenting Author: Nicola Menga

Lunch 12.15 - 13.45 - 1st floor

**3-10 - Mechanics of Generalized Continua with - Mechanics of Cohesion-adhesion Interactions and their Applications to Sizedependent Thin Structures** Morning Session

DAY: Friday

ROOM: Celeste

TIME 10.15-12.15

CHAIR: Chairman Sergey Lurie, Chairman Mikhail Grekov

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|---|---|---|
| **KEYNOTE** | **360** | **Size-dependent piezoelectric gradient beams: analytical solutions and numerical 3D FE validation**<br>Authors: Yury Solyaev<br>Presenting Author: Yury Solyaev |
| **INVITED** | **459** | **Evaluation of mechanical and adhesive properties of thin elastic layers**<br>Authors: Nikolay Perepelkin, Feodor Borodich<br>Presenting Author: Nikolay Perepelkin |
| | **165** | **Nonlocal interactions in elastic materials**<br>Authors: Victoria Presnetsova, Sergey Romashin, Larisa Frolenkova, Vladimir Shorkin, Svetlana Yakushina<br>Presenting Author: Vladimir S. Shorkin |
| **INVITED** | **1440** | **Entropy production for the one dimensional ballistic heat equation**<br>Authors: Aleksei Sokolov, Anton Krivtsov, Wolfgang Müller<br>Presenting Author: Aleksei Sokolov |
| | **877** | **Stress-strain state of an elastic body with almost circular nanoinclusion**<br>Authors: Aleksandra Vakaeva, Mikhail Grekov<br>Presenting Author: Aleksandra Vakaeva |
| | **1216** | **The problem of eigenvalues of material properties tensors and velocities of wave propagation in the structures**<br>Authors: Mikhail Nikabadze, Armine Uluhanyan, Sergey Lurie<br>Presenting Author: Mikhail Nikabadze |

Lunch 12.15 - 13.45 - 1st floor

**7-5 - New Concepts for Advanced Materials and Structures** Morning Session

DAY: Friday

ROOM: Magenta B

TIME 10.15-12.15

CHAIR: Michele Brun, Vincent Pagneux

**623** **Waves in space-time microstructures: The theory of field patterns**

Authors: Ornella Mattei, Graeme Milton

Presenting Author: Ornella Mattei

**540** **Broadband non-reciprocity in active-feedback mechanical metamaterials**

Authors: Corentin Coulais

Presenting Author: Corentin Coulais

**377** **Generalized Fibonacci structures: a new paradigm for the design of quasicrystalline waveguides and thin films**

Authors: Lorenzo Morini, Massimiliano Gei

Presenting Author: Lorenzo Morini

**1214** **Applications of Elliptical Microstructure in Novel Acoustical Devices.**

Authors: William Rowley, William Parnell, David Abrahams, Ruth Voisey

Presenting Author: William D. Rowley

**632** **An Asymptotic Dynamic Model for an Elastic Metasurface**

Authors: Peter Wootton, Daniel Colquitt, Julius Kaplunov

Presenting Author: Peter Wootton

**845** **Harnessing Geometry to Manipulate Vector Soliton in Architected Materials: from Splitters to Diodes**

Authors: Bolei Deng, Pai Wang, Qi He, Vincent Tournat, Katia Bertoldi

Presenting Author: Bolei Deng

Lunch 12.15 - 13.45 - 1st floor

**2-4 - Mechanics of Soft Biological Tissues** Afternoon Session

DAY: Friday

ROOM: Ciano A

TIME 13.45-15.45

CHAIR: Nino Horvat, Christopher Blase

**965 Numerical modeling of effects of thrombus with variable thickness on fusiform abdominal aortic aneurysm growth**

Authors: Nino Horvat, Lana Virag, Igor Karšaj

Presenting Author: Nino Horvat

**1127 Dual 3D printed material mimicking mechanical behaviour of healthy and aneurysmal arterial tissue**

Authors: Marija Smoljkić, Lana Virag, Ante Jurćević, Kristijan Kubik, Ivan Grabić, Damir Godec, Igor Karšaj

Presenting Author: Marija Smoljkić

**1475 Morphological Analysis of Calcification in Abdominal Aortic Aneurysm**

Authors: Zinan He, Rosaire Mongrain, Simon Lessard, Gilles Soulez

Presenting Author: Zinan He

**986 Validation of an inverse approach for in vivo identification of AAA wall properties based on 4D ultrasound strain imaging**

Authors: Andreas Wittek, Wojciech Derwich, Thomas Schmitz-Rixen, Christopher Blase

Presenting Author: Christopher Blase

**1179 Comparison of Experimental and Numerical Results for Dynamics of Thoracic Human Aortas**

Authors: Marco Amabili, Ivan Breslavsky, Giovanni Ferrari, Eleonora Tubaldi, Prabakaran Balasubramanian, Ali Kassab, Rosaire Mongrain, Goffredo Arena

Presenting Author: Marco Amabili

Closing Cerimony 15.45 - Europa Auditorium

**7-2 - Steel Structures: Mechanics, Simulation and Testing** Afternoon Session

DAY: Friday

ROOM: Ciano B

TIME 13.45-15.45

CHAIR: Ahmer Wadee, Markus Knobloch

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| **1555** | **Analytical behavior of special-shaped CFST stub columns under axial compression**<br>Authors: Fa-cheng Wang, Lin-hai Han<br>Presenting Author: Lin-hai Han |
| **1557** | **Flexural-torsional buckling behaviour of fixed-ended and pin-ended cold-formed stainless steel angle section columns**<br>Authors: Lulu Zhang, Ou Zhao, Kang-Hai Tan<br>Presenting Author: Ou Zhao |
| **764** | **Residual stress patterns on cold-formed normal strength and high strength steel polygonal hollow sections**<br>Authors: Jiong-Yi Zhu, Han Fang, Tak-Ming Chan<br>Presenting Author: Tak-Ming Chan |
| **220** | **Experimental investigation of round-ended concrete-filled double skin tubular short columns**<br>Authors: Mostafa Hassanein, Ahmed El Hadidy, Mahmoud El-Boghdadi, Aya Handousa<br>Presenting Author: Mostafa Hassanein |
| **621** | **The Brazier effect for elastic and plastic pipe beams with foam cores**<br>Authors: Daniele Zulli, Angelo Luongo<br>Presenting Author: Daniele Zulli |
| **958** | **Generating fundamental buckling mode shapes using finite elements**<br>Authors: Jurgen Becque, Xilin Li<br>Presenting Author: Jurgen Becque |

Closing Cerimony 15.45 - Europa Auditorium

**3-4 - Mechanics of Granular Media: Experiments, Theory and Modelling** Afternoon Session

DAY: Friday

ROOM: Bianca A

TIME 13.45-15.45

CHAIR: Alessandro Gajo, Ken Kamrin, Stefan Luding

**1411** **Towards a universal description of cohesive-particle flows**

Authors: Casey LaMarche, Peiyuan Liu, Kevin Kellogg, Christine Hrenya

Presenting Author: Christine Hrenya

**288** **Collapse of Granular Column: Influence of Particle Shape and Polydispersity**

Authors: Denis Dumont, Paul Rambach, Pascal Damman

Presenting Author: Denis Dumont

**339** **Non-spherical granular flows down an incline, morphology and rheological response**

Authors: Raúl Cruz Hidalgo, Balázs Szabó, Katalin Gillemot, Tamás Börzsönyi, Thomas Weinhart

Presenting Author: Raúl Cruz Hidalgo

**350** **Anisotropic inertia rheology of ellipsoidal grains**

Authors: Ben Nadler, Francois Guillard, Itai Einav

Presenting Author: Ben Nadler

**1519** **Experimental and numerical study of the effects of granular mixture composition on the elastic moduli**

Authors: Kianoosh Taghizadeh, Holger Steeb, Vanessa Magnanim, Stefan Luding

Presenting Author: Kianoosh Taghizadeh

Closing Cerimony 15.45 - Europa Auditorium

**5-2 - Cohesive-zone Modelling – Advances and Challenges** Afternoon Session

DAY: Friday

ROOM: Bianca B

TIME 13.45-15.45

CHAIR: Albert Turón, Giulio Alfano, Bent F. Sørensen

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| **1280** | **A mechanical model for the peeling of a busbar from a solar cell**<br>Authors: Nicola Dardano, Claudia Borri, Marco Paggi<br>Presenting Author: Nicola Dardano |
| **1212** | **Recent advances in the development of rate-dependent cohesive-zone models based on fractional viscoelasticty**<br>Authors: Leo Skec, Giulio Alfano, Gordan Jelenic<br>Presenting Author: Giulio Alfano |
| **1321** | **Effect of Cohesive Law Parameters on Instability of Crack Growth**<br>Authors: Bent F. Sørensen, Stergios Goutianos, Helmuth Toftergaard<br>Presenting Author: Bent F. Sørensen |
| **1327** | **Experimental and numerical characterisation of the Ti6Al4V-concrete interface via pull-out tests**<br>Authors: Diletta Maracci, Giulio Alfano, Roberto Serpieri, Stefano Lenci<br>Presenting Author: Diletta Maracci |
| **1463** | **Fractional viscoelastic mixed-mode fracture: A PPR-based rate-dependent cohesive zone model using fractional calculus**<br>Authors: Oliver Giraldo-Londono, Glaucio H. Paulino, William G. Buttlar<br>Presenting Author: Oliver Giraldo-Londono |

Closing Cerimony 15.45 - Europa Auditorium

**8-1 - Micromechanics-based Nonlocal Continuum Models** Afternoon Session

DAY: Friday

ROOM: Europa A

TIME 13.45-15.45

CHAIR: Samuel Forest, Lorenzo Bardella

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| **INVITED** | **554** | **Generalized enriched continuum emerging from the homogenization of locally resonant metamaterials** |
| | | Authors: Varvara Kouznetsova, Ashwin Shridhar, Lei Liu, Marc Geers |
| | | Presenting Author: Varvara Kouznetsova |
| **INVITED** | **1098** | **Rigorous homogenization results leading to generalized continua models** |
| | | Authors: Houssam Abdoul Anziz, Pierre Seppecher |
| | | Presenting Author: Houssam Abdoul Anziz |
| **INVITED** | **1084** | **Enhanced micromorphic modelling of Bloch waves propagation in blocky periodic materials** |
| | | Authors: Andrea Bacigalupo, Luigi Gambarotta |
| | | Presenting Author: Andrea Bacigalupo |
| **INVITED** | **1309** | **Mindlin second-gradient elastic properties from hexagonal lattice** |
| | | Authors: Gianluca Rizzi, Daniele Veber, Francesco Dal Corso, Davide Bigoni |
| | | Presenting Author: Gianluca Rizzi |
| | **1056** | **A Cosserat framework for dynamic recrystallization** |
| | | Authors: Anna Ask, Samuel Forest, Benoit Appolaire, Kais Ammar, Oguz Umut Salman |
| | | Presenting Author: Anna Ask |

Closing Cerimony 15.45 - Europa Auditorium

**3-6 - Multi-Physics of Solids at Fracture** Afternoon Session

DAY: Friday

ROOM: Europa B

TIME 13.45-15.45

CHAIR: B. Markert, G. Mishuris

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| **KEYNOTE** | **476** | **On the effect of a mode-dependent fracture toughness upon the instability of coplanar crack propagation in mode I+III**<br>Authors: Jean-Baptiste Leblond, Alain Karma, Laurent Ponson, Aditya Vasudevan<br>Presenting Author: Jean-Baptiste Leblond |
| | **1263** | **Theoretical modelling of thermal fracture of functionally graded coatings on a homogeneous substrate**<br>Authors: Vera Petrova, Siegfried Schmauder<br>Presenting Author: Vera Petrova |
| | **1393** | **Simulation of 3D thermo-mechanical crack face contact with the XFEM**<br>Authors: Stefan Loehnert, Artsem B. Kunin, Peter Wriggers<br>Presenting Author: Stefan Loehnert |
| | **386** | **Mechanochemical corrosion of long tubes under own weight**<br>Authors: Yulia Pronina, Irina Stareva<br>Presenting Author: Yulia Pronina |
| | **761** | **Damage assessment using clustered acoustic emission signals in flax/epoxy quasi-unidirectional woven laminates**<br>Authors: Malika Kersani, Stepan Lomov, Ahcène Bouabdallah<br>Presenting Author: Malika Kersani |

Closing Cerimony 15.45 - Europa Auditorium

**4-2 - In situ Characterisation of materials** Afternoon Session

DAY: Friday

ROOM: Europa C

TIME 13.45-15.45

CHAIR T. Pardoen, E. Maire

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| KEYNOTE | 1189 | **On the heterogenity of deformation in polycrystalline metals evaluated through in situ microscopy**<br>Authors: Krishnaswamy Ravi-Chandar, Andrew Gross<br>Presenting Author: Krishnaswamy Ravi-Chandar |
| | 1322 | **In situ identification of the failure mechanisms in self-reinforced poly(lactic acid) composites**<br>Authors: Stergios Goutianos, Bent F. Sørensen, Lien Van der Schueren<br>Presenting Author: Stergios Goutianos |
| | 500 | **Nanomechanical Measurements of Carbon Nanotube-Metal Interfaces**<br>Authors: Chenglin Yi, Christopher M. Dmuchowski, Feilin Gou, Xiaoming Chen, Changhong Ke<br>Presenting Author: Changhong Ke |

Closing Cerimony 15.45 - Europa Auditorium

## 9-1 - Multi-scale Solids and Homogenization

Afternoon Session

DAY: Friday

ROOM: Indaco

TIME 13.45-15.45

CHAIR Natasha Movchan, Ross McPhedran

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|---|---|---|
| **INVITED** | **247** | **Roto-flexural waves in elastic beams with gyro-hinges**<br>Authors: Giorgio Carta, Michael Nieves, Ian Jones, Natasha Movchan, Alexander Movchan<br>Presenting Author: Giorgio Carta |
| | **663** | **Dispersive and effective properties of a two-dimensional periodic medium at low frequencies**<br>Authors: Yuri Godin, Boris Vainberg<br>Presenting Author: Yuri Godin |
| | **356** | **A hierarchical atomistic-on-continuum framework to compute minimum energy paths for a chain of bi-stable elements**<br>Authors: Manfred Ulz<br>Presenting Author: Manfred Ulz |
| | **601** | **Adaptive scale information exchange in the CADD framework at finite temperature**<br>Authors: Patrick Wurm, Manfred H. Ulz<br>Presenting Author: Patrick Wurm |
| | **1559** | **Homogenization of photonic quasicrystals : An asymptotic analysis**<br>Authors: Elena Cherkaev, Sebastien Guenneau, Niklas Wellander, Frederic Zolla<br>Presenting Author: Sebastien Guenneau |

Closing Cerimony 15.45 - Europa Auditorium

**5-5 - Non-local Models for Damage and Fracture** Afternoon Session

DAY: Friday

ROOM: Rossa A

TIME 13.45-15.45

CHAIR: Erkan Oterkus, Ugo Galvanetto

**1090** **Peridynamics modeling of dynamic fracture in solids**

Authors: George Gazonas, Raymond Wildman

Presenting Author: George Gazonas

**1364** **Peridynamics guided crack growth in isogeometric analysis**

Authors: Erdogan Madenci, Mehmet Dorduncu, Nam Phan

Presenting Author: Erdogan Madenci

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**3-11 - Generalized Continua** Afternoon Session

DAY: Friday

ROOM: Rossa B

TIM 13.45-15.45

CHAIR Victor Eremeyev

**1071** **Enhanced continua models for solid-like granular media**

Authors: Elena Grekova, Francisco Ruíz Botello

Presenting Author: Elena Grekova

**692** **Micromagnetics of Galfenol**

Authors: Vivekanand Dabade, Raghavendra Venkatraman, Richard James

Presenting Author: Vivekanand Dabade

**619** **Effect of Surface Stresses on Stability of Elastic Cylindrical Tube Under Combined Loading**

Authors: Denis Sheydakov, Irina Mikhailova

Presenting Author: Denis Sheydakov

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**3-5 - Mechanics and Physics of Solids and Structures** Afternoon Session

DAY: Friday

ROOM: Italia

TIME 13.45-15.45

CHAIR S. Patinet, G. Tomassetti

**1213** **Elastic, Viscoelastic and Porelastic Effects in the Wetting of Soft Gels**

Authors: Menghua Zhao, Julien Dervaux, Tetsu Narita, François Lequeux, Laurent Limat, Matthieu Roché

Presenting Author: Laurent Limat

**1471** **Simple modelling of biological and artificial composites consisting of soft and hard elements: from nacre, spider-web, to Kirigami**

Authors: Ko Okumura

Presenting Author: Ko Okumura

**1267** **Large strain rheology plays a key role in the peeling of a soft adhesive**

Authors: Matteo Ciccotti, Julien Chopin, Richard Villey, Etienne Barthel, Costantino Creton, David J. Yarusso

Presenting Author: Matteo Ciccotti

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**7-5 - New Concepts for Advanced Materials and Structures** Afternoon Session

DAY: Friday

ROOM: Magenta B

TIME 13.45-15.45

CHAIR: Michele Brun, Vincent Pagneux

**749** **Mechanical energy flux in the wave motion of beam lattice models for non-dissipative periodic materials**

Authors: Marco Lepidi, Andrea Bacigalupo

Presenting Author: Marco Lepidi

**1361** **Reduced-Order Modelling and Adjoint Sensitivity Analysis for Geometric Nonlinear Topology Optimization Problems**

Authors: Yi Zhang, Dirk Munro, Fred van Keulen, Xiaoqian Chen

Presenting Author: Dirk Munro

**1239** **Study on auxetic structures for vibration isolation applications**

Authors: Adrien Pyskir, Manuel Collet, Zoran Dimitrijevic, Claude-Henri Lamarque

Presenting Author: Adrien Pyskir

**718** **A 2D microstructure with auxetic out-of-plane behavior and non-auxetic in-plane behavior**

Authors: Cesare Davini, Antonino Favata, Andrea Micheletti, Roberto Paroni

Presenting Author: Antonino Favata

**1125** **Auxetic microstructured media**

Authors: Michele Brun, Giorgio Carta, Antonio Baldi, Luigi Cabras, Alice Mocci

Presenting Author: Michele Brun

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