



# ESMC 2022

11<sup>TH</sup> EUROPEAN SOLID MECHANICS CONFERENCE

## 11<sup>th</sup> European Solid Mechanics Conference

4 – 8 July 2022 | NUI Galway, Ireland



NUI Galway  
OÉ Gaillimh



Fáilte Ireland  
National Tourism Development Authority

MEET IN  
IRELAND

Dear Colleagues,

It gives me great pleasure to announce the 11th European Solid Mechanics Conference to be held in Galway, Ireland, 4th – 8th July, 2022 (ESMC 2022). The conference is being held under the auspices of the European Mechanics Society (EUROMECH <https://euomech.org/>).

The European Solid Mechanics Conference is the major event for the solid mechanics community in Europe, and provides a unique forum for scientists and engineers from Europe and across the world 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.

Solid mechanics is the bedrock of engineering design in areas such as mechanical engineering, civil and structural engineering, and biomedical engineering. It is a critically important element in the design and development of almost all technologies and products in these areas, such as aircraft, automobiles, buildings, bridges, and medical implants and devices. Further, solid mechanics is a key enabler in the development of new technologies that address the major global challenges of our time in sustainability, renewable energy and health.

The first European Solid Mechanics Conference was held in Munich in 1991. This very successful conference initiated a tri-annual series with subsequent conferences held in Genova, Stockholm, Metz, Thessaloniki, Budapest, Lisbon, Graz, Madrid and Bologna. The 11th European Solid Mechanics Conference will take place at the National University of Ireland Galway, in the city of Galway, Ireland.

We have assembled an outstanding group of invited lecturers for the conference, covering the General Lecture and five Plenary Lectures.

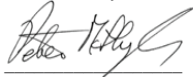
The conference is organised in terms of the following eight themes:

- Mechanics of Materials
- Biomechanics and Medical Implants
- Continuum Mechanics
- Experimental Mechanics
- Computational Mechanics
- Dynamics, Waves and Metamaterials
- Structural Mechanics
- Multiphysics and Multiscale Problems

There is a General Session for each theme and over fifty Mini-Symposia that cover a range of specialised topics, grouped under each theme.

We warmly welcome you to the wonderful city of Galway for what promises to be a very exciting and stimulating event.

Yours sincerely,



**Peter E. McHugh**

Chair of ESMC 2022



Peter E. McHugh, PhD, DSc, MRIA, FIEI, FIAE, CEng  
Head of School of Engineering | Ceann Scoil na hInnealtóireachta  
Professor of Biomedical Engineering | Ollamh le hInnealtóireacht Bhitheighis  
College of Science and Engineering | Coláiste na hEolaíochta & na hInnealtóireachta  
NUI Galway | OÉ Gaillimh

## GENERAL LECTURER



### **Thomas J.R Hughes**

*Peter O'Donnell Jr. Chair in Computational and Applied Mathematics  
Professor of Aerospace Engineering and Engineering Mechanics  
University of Texas at Austin*

## PLENARY LECTURERS



### **Gerard A. Ateshian**

*Andrew Walz Professor of Mechanical Engineering  
Professor of Biomedical Engineering  
Columbia University*



### **Vikram Deshpande**

*Professor in Materials Engineering  
University of Cambridge*



### **Ellen Kuhl**

*Robert Bosch Department Chair and Professor of Mechanical Engineering  
Stanford University*



### **Javier Llorca**

*Scientific Director, IMDEA Materials Institute  
Professor of Materials Science, Polytechnic University of Madrid*



### **Alan Needleman**

*University Distinguished Professor and Royce E. Wisenbaker '39 Chair II  
Texas A&M University*

## GENERAL SESSIONS

- Mechanics of Materials
- Biomechanics and Medical Implants
- Continuum Mechanics
- Experimental Mechanics
- Computational Mechanics
- Dynamics, Waves and Metamaterials
- Structural Mechanics
- Multiphysics and Multiscale Problems

## MINI-SYMPOSIA

### Mechanics of Materials

#### Mechanics of Composite Materials

Organisers: Pedro Camanho (University of Porto), Paul Weaver (University of Limerick)

#### Micromechanics-based Nonlocal Continuum Models

Organisers: Lorenzo Bardella (University of Brescia), Samuel Forest (Mines ParisTech CNRS)

#### Architected Materials

Organisers: Katia Bertoldi (Harvard University), Damiano Pasini (McGill University)

#### Mechanics of Textile Composite Reinforcements and Fibrous Materials

Organisers: Philippe Boisse (Université de Lyon), Stepan Lomov (KU Leuven), Dmytro Vasiukov (IMT Lille Douai)

#### Micro and Nano Systems and Applications

Organisers: Horacio Espinosa (Northwestern University), Vittorio Ferrari (University of Brescia), Attilio Frangi (Politecnico di Milano), Maria F. Pantano (University of Trento)

#### Multiscale Modelling of Polycrystalline Materials

Organisers: Javier Segurado (Universidad Politécnica de Madrid), Ricardo A. Lebensohn (Los Alamos National Laboratory)

#### Modelling of Multi-Functional Materials and Related Material Systems

Organisers: Stefanie Reese (Aachen University), Stanislaw Stupkiewicz (Institute of Fundamental Technological Research)

#### Topology Optimization for Additive Manufacturing

Organisers: Fred van Keulen (TU Delft), Pierre Duysinx (Liège University), Can Ayas (TU Delft)

#### Modelling of Plasticity at Multiple Length Scales

Organisers: Fionn Dunne (Imperial College London), Noel O'Dowd (University of Limerick)

#### Mechanics of Additive Manufactured Materials

Organisers: Catrin Davies (Imperial College London), Noel Harrison (NUI Galway)

#### Computational and Data Driven Homogenization for Nonlinear Composites

Organisers: Elio Sacco (University of Naples Federico II), Djimédo Kondo (Université Pierre et Marie Curie), Felix Fritzen (University of Stuttgart), Sonia Marfia (University Roma Tre)

#### Polymer Mechanics

Organisers: Gary Menary (Queen's University Belfast), Alex Lennon (Queen's University Belfast)

### Biomechanics and Medical Implants

#### Mechanics of Biological Cells and Active Tissues

Organisers: José Manuel García Aznar (Universidad de Zaragoza), Patrick McGarry (NUI Galway), Eoin McEvoy (NUI Galway)

#### Mechanics of Soft Biological Tissues

Organisers: Gerhard A. Holzapfel (Graz University of Technology), Ray W. Ogden (University of Glasgow)

#### Cardiovascular Biomechanics and Mechanobiology: from Basics to Clinical Applications

Organisers: Christian Cyron (Hamburg University of Technology), Alessandro Veneziani (Emory University and IUSS Pavia), Cairiona Lally (Trinity College Dublin)

#### Mechanics of Mineralised Tissues

Organisers: Glen Niebur (University of Notre Dame), Enrico Dall'ara (University of Sheffield), Ted Vaughan (NUI Galway)

#### Biomechanics of Blood Clots and Thrombectomy Devices

Organisers: Jose Rodriguez Matas (Politecnico di Milano), Ed Van Bavel (Amsterdam UMC), Behrooz Fereidoonzehad (NUI Galway)

#### Mechanics of Biodegradable Materials

Organisers: Lorenza Petrini (Politecnico di Milano), Joao Silva Soares (Virginia Commonwealth University), William Ronan (NUI Galway)

#### Mechanics of Impact and Trauma

Organisers: Michael Gilchrist (University College Dublin), Svein Kleiven (KTH Stockholm), Andrew Post (University of Ottawa)

#### Mechanics of Soft Robotic Devices

Organisers: Ellen Roche (Massachusetts Institute of Technology), Xuanhe Zhao (Massachusetts Institute of Technology), Eimear Dolan (NUI Galway)

#### Mechanics of Cardiovascular Implants and Devices: Modelling, Imaging and Testing

Organisers: Francesco Migliavacca (Politecnico di Milano), Michael Walsh (University of Limerick), Claire Conway (RCSI, Dublin)

## Continuum Mechanics

### Contact Mechanics

Organisers: Michel Raouis (Laboratory of Mechanics and Acoustics - CNRS), Peter Wriggers (Leibniz Universität Hannover), Giorgio Zavarise (Università del Salento)

### Homogenisation and Continuum Strategies for Multiphase and Active Materials

Organisers: Issam Dagbri (Université catholique de Louvain), Nicolas Triantafyllidis (Ecole Polytechnique), Pedro Ponte Castañeda (University of Pennsylvania); Kostas Danas (Ecole Polytechnique)

### Material Instabilities

Organisers: Ahmed Benallal (LMT, Ens Paris Saclay/CNRS), Henryk Petyk (Institute of Fundamental Technological Research, IPPT)

### Mechanics of Granular Media: Experiments, Theory and Modelling

Organisers: Alessandro Gajo (University of Trento), Ken Kamrin (Massachusetts Institute of Technology), Stefan Luding (University of Twente)

### Mechanics and Physics of Structures

Organisers: Sébastien Neukirch (CNRS/UPMC), Benoit Roman (CNRS/UPMC), Keith Seffen (University of Cambridge), Francesco Dal Corso (University of Trento)

### Advanced Modelling of Hydromechanically Driven Discontinuities

Organisers: Gennady Mishuris (Aberystwyth University), Alexandre Lavrov (Norwegian University of Science and Technology), Brice Lecampion (EPFL, Lausanne), Panos Papanastasiou (Cyprus University of Technology)

### Nonlinear Elasticity

Organisers: Luis Dorfmann (Tufts University), Yibin Fu (Keele University), Patrizio Neff (Universitaet Duisburg-Essen)

### Recent Advances in Damage Mechanics

Organisers: Claudia Comi (Politecnico di Milano), Jean-Francois Molinari (EPFL, Lausanne), Nicolas Moës (Ecole Centrale de Nantes)

### The Physics of Dense Granular Media

Organisers: Lou Kondic (New Jersey Institute of Technology), Corey O'Hern (Yale University)

### Generalized Continua – New Developments and Applications

Organisers: Holm Altenbach (Otto-von-Guericke-Universität Magdeburg), Panagiotis Gourgias (Durham University), Victor Eremeyev (Rzeszow University of Technology)

### Stability of Soft Matter

Organisers: Michel Destradé (NUI Galway), Valentina Balbi (NUI Galway), Alain Goriely (University of Oxford)

### Mechanics of Fatigue and Fretting

Organisers: Seán Leen (NUI Galway), David Nowell (Imperial College London), Siegfried Fowry (École Centrale de Lyon)

## Experimental Mechanics

### Experimental Micromechanics and Nanomechanics

Organisers: Gerhard Dehm (Max-Planck-Institut für Eisenforschung), Jon Molina-Aldareguía (IMDEA Materials Institute), Miguel Monclus (IMDEA Materials Institute)

### In-situ Mechanical Characterisation of Materials

Organisers: Eric Maire (INSA Lyon), Thomas Pardoën (Université Catholique de Louvain)

### Non-invasive and Inverse Methods for Constitutive Parameter Identificat

Organisers: Sam Evans (Cardiff University, UK), Stéphane Avril (MINES Saint-Étienne), Kevin Moerman (NUI Galway), Dana Solov (Technion – Israel Institute of Technology)

## **Computational Mechanics**

### **Cohesive-zone Modelling – Advances and Challenges**

*Organisers: Albert Turón (Universitat de Girona), Giulio Alfano (Brunel University), Bent F. Sørensen (Technical University of Denmark)*

### **Geometry and Discretisation**

*Organisers: Alessandro Reali (University of Pavia), Pablo Antolin Sanchez (EPFL, Lausanne)*

### **Models and Simulation Methods in (Metal) Additive Manufacturing**

*Organisers: Ignacio Romero (IMDEA Materials Institute), Adrian Lew (Stanford University)*

### **Non-local Models for Damage and Fracture**

*Organisers: Ugo Galvanetto (University of Padua), Erkan Oterkus (University of Strathclyde)*

### **Mechanics in Energy Harvesting and Storage**

*Organisers: Robert McMeeking (UC Santa Barbara), Alberto Salvadori (University of Brescia), Alejandro Franco (Université de Picardie Jules Verne), Marc Kamlah (Karlsruhe Institute of Technology), Vikram Deshpande (University of Cambridge)*

### **Advances in Analytical and Discretisation Methods for Discontinuities and Singularities**

*Organisers: Elena Benvenuti (University of Ferrara), Andrea Chiozzi (University of Ferrara), N. Sukumar (UC Davies), Gianmarco Manzini (Los Alamos National Laboratory)*

## **Dynamics, Waves and Metamaterials**

### **Nonlinear Dynamics in Mechanical and Structural Systems**

*Organisers: Sergey Sorokin (Aalborg University), Jon Juel Thomsen (Technical University of Denmark), Giuseppe Rega (Sapienza University of Rome)*

### **Elastic Metamaterials**

*Organisers: Alexander Movchan (University of Liverpool), Sebastian Guenneau (Aix-Marseille University), Diego Misseroni (University of Trento)*

### **Dynamic Phenomena and Transition in Structured Media**

*Organisers: Michael Nieves (Keele University), Andrea Piccolroaz (University of Trento), Anastasia Kisil (University of Manchester), Gennady Mishuris (Aberystwyth University)*

### **Nonlinear Waves in Solids**

*Organisers: Aleksei Porubov (St. Petersburg State University), Giuseppe Saccomandi (University of Perugia)*

## **Structural Mechanics**

### **Steel Structures: Mechanics, Simulation and Testing**

*Organisers: Jurgen Becque (University of Cambridge), Ahmer Wadee (Imperial College London)*

### **Instabilities in Structural Mechanics and Fluid-Structure Interactions**

*Organisers: Oleg Kirillov (Northumbria University), Olivier Doare (ENSTA Paristech)*

### **Novel Microstructured and Microarchitected Materials**

*Organisers: Michele Brun (University of Cagliari), Vincent Pagneux (Lab. Acoustique Univ. Maine – CNRS)*

### **Design and Development of Sustainable and Resilient Structures**

*Organisers: Jamie Goggins (NUI Galway), Feargal Brennan (University of Strathclyde), Gerard O'Reilly (IUSS Pavia)*

### **Mechanics of Flexible Structures**

*Organisers: Vikram Pakrashi (University College Dublin), Gordan Jelenić (University of Rijeka)*

## **Multiphysics and Multiscale Problems**

### **Multi-scale Solids and Homogenisation**

*Organisers: Natasha Movchan (University of Liverpool), Daniel Colquitt (University of Liverpool), Ross McPhedran (University of Sydney)*

### **Nonlinear Electro-Elasticity and its Applications**

*Organisers: Weiqi Chen (Zhejiang University), Giuseppe Zurlò (NUI Galway), Stephan Rudykh (University of Wisconsin–Madison)*

### **Variational Methods in Modelling for Multi-Physics Problems**

*Organisers: Anna Pandolfi (Politecnico di Milano), Laurent Stainier (Ecole Centrale de Nantes), Kerstin Weinberg (Universität Siegen)*

### **Multiscale Materials Modelling from Atoms to Macroscale**

*Organisers: Siegfried Schmauder (University of Stuttgart), Somnath Ghosh (Johns Hopkins University), Bill Curtin (EPFL, Lausanne), Vera Petrova (University of Stuttgart)*

### **Composites Manufacturing and Joining: New Developments for More Efficient Structures**

*Organisers: Ronan O'Higgins (University of Limerick), Irene Fernandez Villegas (TU Delft), Ben Woods (University of Bristol)*

## CONFERENCE SCIENTIFIC COMMITTEE

### Chair

**Prof. Gerhard A. Holzapfel**

Graz University of Technology,  
and Norwegian University of Science and Technology

### Members

**Prof. Pedro Camanho**

University of Porto

**Prof. Samuel Forest**

Mines ParisTech CNRS

**Prof. Ugo Galvanetto**

University of Padua

**Prof. Odd Sture Hopperstad**

Norwegian University of Science and Technology

**Prof. Jean-François Molinari**

École Polytechnique Fédérale de Lausanne

**Prof. Christian F. Niordson (Co-Chair)**

Technical University of Denmark

**Prof. Patrick Onck**

University of Groningen

**Prof. Alexey Porubov**

Russian Academy of Sciences

**Prof. Kerstin Weinberg**

Universität Siegen

## LOCAL ORGANISING COMMITTEE

### Chairperson

**Prof. Peter McHugh**

National University of Ireland Galway

### Members

**Dr Valentina Balbi**

National University of Ireland Galway

**Dr Richard Barrett**

National University of Ireland Galway

**Dr Claire Conway**

Royal College of Surgeons in Ireland

**Prof. Michel Destrade**

National University of Ireland Galway

**Dr Eimear Dolan**

National University of Ireland Galway

**Prof. Nicholas Dunne**

Dublin City University

**Dr Behrooz Fereidoonzehad**

National University of Ireland Galway

**Prof. Michael Gilchrist**

University College Dublin

**Prof. Jamie Goggins**

National University of Ireland Galway

**Dr Noel Harrison**

National University of Ireland Galway

**Prof. Alojz Ivankovic**

University College Dublin

**Prof. Caitríona Lally**

Trinity College Dublin

**Prof. Seán Leen**

National University of Ireland Galway

**Dr Eoin McEvoy**

National University of Ireland Galway

**Dr Patrick McGarry**

National University of Ireland Galway

**Prof. Laoise McNamara**

National University of Ireland Galway

**Dr Kevin Moerman**

National University of Ireland Galway

**Prof. Jeremiah Murphy**

Dublin City University

**Prof. Noel O'Dowd**

University of Limerick

**Dr Ronan O'Higgins**

University of Limerick

**Dr William Ronan**

National University of Ireland Galway

**Prof. David Taylor**

Trinity College Dublin

**Dr Mingming Tong**

National University of Ireland Galway

**Dr Ted Vaughan**

National University of Ireland Galway

**Dr Giuseppe Zurlo**

National University of Ireland Galway

## **ABSTRACT SUBMISSION**

Authors wishing to contribute to the conference through the General Sessions or a Mini-Symposium are invited to submit a two-page abstract. Abstracts will be submitted online via the Abstract Submission Portal. A template will be provided. The conference programme will include only the accepted abstracts. Each participant is allowed to present one paper. Abstract submission will open on 12th July 2021 and the deadline for abstract submission is 19th November 2021.

## **CONFERENCE FORMAT**

The Conference will take place from Monday 4th – Friday 8th July, 2022. In addition to the invited lectures, there will be the “EUROMECH Solid Mechanics Prize” lecture. An award ceremony for EUROMECH Fellows will be held. “Young Researcher” and “Best poster” awards will be presented. Further details will be available on the conference web page: [www.esmc2022.org](http://www.esmc2022.org)

## **LOCATION**

The Conference will take place at the National University of Ireland Galway (NUI Galway). Galway is a city located on the West Coast of Ireland, which sits on the River Corrib between Lough Corrib and Galway Bay. Galway is a vibrant, cosmopolitan city steeped in culture, rich in folklore and famous for its cobble-stoned streets, quaint shops and charming restaurants. Galway is known as Ireland’s cultural heart and is renowned for its vibrant lifestyle and numerous festivals, celebrations and events.

Galway and its hinterland boasts some of the most beautiful scenery in the world. The landscape leaves one breathless, from the prehistoric fort of Dun Aengus, the most westerly point in Europe, to Connemara and the Burren.

Galway city has experienced very rapid growth in recent years and has a strong local economy with complementary business sectors, including manufacturing industry, tourism, retail and distribution, education, healthcare and services that include financial, construction, cultural, and professional. In particular, Galway is at the heart of Ireland’s rapidly developing global medical technology industry hub.

## **ACCOMMODATION**

On campus accommodation at NUI Galway will be available and we will also offer some hotel options in the City Centre, which is within walking distance of the venue. Further details will be available on the conference web page: [www.esmc2022.org](http://www.esmc2022.org) and accommodation will be available to book via the Conference Registration Form.

## **ABOUT EUROMECH**

EUROMECH — the European Mechanics Society is an international non-governmental non-profit scientific organisation, whose objective is to engage in all activities intended to promote in Europe the development of mechanics as a branch of science and engineering. Activities within the field of mechanics range from fundamental research on the behaviour of fluids and solids to applied research in engineering. The approaches used comprise theoretical, analytical, computational and experimental methods. Further details are available on [www.euomech.org](http://www.euomech.org)



## REGISTRATION

The registration fee includes attendance at the conference sessions, lunch and coffee breaks, and the reception.

Early Registration (up to 31 March 2022)	
Standard	€625
Student	€375
Low & Middle Income (LMI) Countries	€375
Late Registration (from 1 April 2022)	
Standard	€675
Student	€425
Low & Middle Income (LMI) Countries	€425
Conference Dinner	
Standard/Student/Low & Middle Income (LMI) Countries	€60

*Registration fees are VAT exempt. The Conference dinner fee includes VAT @ 23%.*

*Please note: The registration fee includes the annual EUROMECH membership fee (€30). Non-EUROMECH members who wish to attend the conference become members automatically for one year when they register for the conference. They will be invited to renew their membership subsequently. The membership of EUROMECH members will automatically be extended by one year.*

## SOCIAL PROGRAMME

The Social Programme will include a reception on Monday evening. The Conference Dinner will be held on Thursday evening. An additional fee will apply for the Conference Dinner and for any accompanying persons who wish to attend the dinner.

## CONFERENCE SECRETARIAT

Abbey Conference & Events  
City Gate  
22 Bridge Street Lower  
Dublin 8  
Ireland  
esm2022@abbey.ie

