Congress Programme

2022

ECCOMAS CONGRESS

OSLO, NORWAY
Greetings from the Co-Chairmen of the Conference

The ECCOMAS Congress 2022 proceeds from a string of previous and successful congresses, the first one organized 30 years ago in Brussels, Belgium, in 1992. This year’s congress is hosted by the Norwegian University of Science and Technology (NTNU), SINTEF, and the Nordic Association for Computational Mechanics in Engineering (NOACM).

After more than two years of a pandemic that unfortunately is still ongoing worldwide, it is our pleasure to welcome you to an entirely in-person event at the congress venue NOVA Spektrum in Lillestrøm, which is part of the Oslo metropolitan area. We hope the event will give you a perfect opportunity to communicate science and further expand personal connections worldwide, particularly for young researchers.

The Nordic countries have quite an impressive list of famous scientists compared to their small population. Furthermore, some of the most prestigious scientific prizes, the Nobel Prize and the Abel Prize, are awarded by Swedish and Norwegian committees to recognize scientific advances. Related to ECCOMAS, we mention two highly influential Norwegian mathematicians. Niels H. Abel (1802-1829) made pioneering contributions in various fields. His most famous result is the first complete proof demonstrating the impossibility of solving the general quintic equation in radicals. He was also an innovator in the field of elliptic functions and a discoverer of Abelian functions. Sophus Lie (1842-1899) is another famous Norwegian mathematician (second only to Abel). He largely created the theory of continuous symmetry and applied it to the study of geometry and differential equations. Lie groups and Lie algebra are named after him and are important tools, e.g., in nonlinear mechanics.

The Nordic countries have a rich history in computational methods in applied sciences, starting with numerical weather prediction from the early days of computers in the late 1940s. A particularly noteworthy engineering achievement is the design and structural analysis of the Troll A platform for the Troll gas field off the west coast of Norway. Rising more than 400 meters, the Troll A Condeep platform is the tallest and heaviest structure that has ever been moved to another position relative to the surface of the Earth. Its design and production are among the largest and most complex engineering projects in history. The structural analyses of the Troll A platform were conducted using SESAM, a finite element method (FEM) program developed initially by Pål G. Bergan (one of the plenary lecturers at this year’s congress) and Erik Åldstedt in 1969 at NTH (now NTNU) and further developed by NTH, SINTEF, and DNV throughout the 1970s and 1980s. “SESAM contributed an enormous amount to the development of the Norwegian oil industry, more than people realize,” said the earlier DNV Software managing director Elling Rishoff.

We are pleased to offer a varied technical program consisting of more than 1700 presentations of ideas and methods that will accelerate the development and usage of state-of-the-art computational methods in a broad spectrum of applications in science and engineering. We mention particularly the significant number of presentations related to the fusion of physics-based (differential equations) and data-driven (artificial intelligence and machine learning) modelling techniques into hybrid analysis and modelling for disruptive development of faster and better computational methods. The presentations consist of 6 plenary, 28 semi-plenary, and 61 keynote lectures held by highly acknowledged researchers. More than 1800 participants from 44 countries will attend the congress.

We wish you all a great congress,

Professor Trond Kvamsdal
Professor Kjell Magne Mathisen
Chief Scientist Knut-Andreas Lie
Professor Mats G. Larson

Oslo, 5 June 2022

NoACM greetings

The Nordic Association of Computational Mechanics (NoACM) represents the Nordic and Baltic countries in ECCOMAS and IACM. The association was founded in 1988, and its first Chairman was Nils-Erik Wiberg, professor of civil engineering at Chalmers University of Technology in Sweden. The mission of NoACM is to promote research in Computational Mechanics and create an arena for collaboration and interaction between the Nordic and Baltic countries and with the ECCOMAS and IACM organizations.

We are delighted that Oslo is the selected venue for the ECCOMAS Congress 2022 and wish to thank the ECCOMAS community for its support and the large number of participants contributing to an inspiring scientific program. We also want to express our gratitude to the organization committee and the secretariat of CIMNE for organizing a fantastic event despite the recent difficulties and uncertainties caused by the pandemic.

The NoACM fully supports the conference and wishes all delegates welcome to Oslo, a great stay, and an exciting congress.

Mats G. Larson, Chairman of NoACM

Oslo, 5 June 2022

Greetings from the President of ECCOMAS

Dear Colleagues, dear Friends,

it is with an infinite pleasure that I am addressing just few lines to all of you.

The pleasure is first of all due to the fact that shortly we are all going to meet in person in Oslo from 5th to the 9th of June for the 8th European Congress on Computational Methods in Applied Sciences and Engineering (ECCOMAS Congress 2022). It will be a fully in-person event and, after such a long period of social distancing, we are all looking forward to a reunion, to great talks, to many scientific discussions, and finally to spend some time in a friendly community. So far more than 1700 abstracts have been accepted for an oral presentation and I am sure that all these contributions, as well as a warm welcome from the excellent local organizers (Trond Kvamsdal, Kjell Magne Mathisen, Knut-Andreas Lie, and Mats G. Larson), will make our meeting an excellent one.

Another strong reason of happiness and pleasure in addressing you is relative to the fact that in Oslo we are going to celebrate the 30th anniversary of our ECCOMAS association. The fact that there is already such a long standing history of meetings, accomplishments, pleasure in sharing research, ideas, friendship is giving us even more willingness in thinking about the future and how to even improve the impact of our community.

Ferdinando Auricchio
President of the European Community on Computational Methods in Applied Sciences (ECCOMAS)

Oslo, 5 June, 2022
ORGANIZERS

Conference Chairpersons

Chair
Professor Trond Kvamsdal
NTNU, Norway

Vice Chair
Professor Kjell Magne Mathisen
NTNU, Norway

Vice Chair
Chief Scientist Knut-Andreas Lie
SINTEF Digital, Norway

Conference Organizers and local hosts

Norwegian University of Science and Technology - NTNU
SINTEF
Nordic Association of Computational Mechanics (NOACM)
European Community on Computational Methods in Applied Sciences (ECCOMAS)

Conference Secretariat

CIMNE Congress Bureau
Campus Nord UPC -Building C3 - "Zona Comercial"
Jordi Girona, 1-3 (08034) - Barcelona, Spain

ORGANIZING COMMITTEES

Executive Committee

Ferdinando Auricchio
President of ECCOMAS

Harald van Brummelen
Secretary General of ECCOMAS

Trond Kvamsdal
Chair of the Conference

Kjell Magne Mathisen
Vice-Chairperson

Knut-Andreas Lie
Vice-Chairperson

Mats G. Larson
Vice-Chairperson

Local Organising Committee

Professor Elena Celledoni
Professor Fredrik Larsson
Chief Scientist Marie E. Rognes

Professor Jianying He
Professor Peter Hansbo
Chief Scientist Tor Dokken

Professor Leif R. Hellevik
Professor Johan Hoffman
Chief Scientist Knut-Andreas Lie

Professor Odd S. Hopperstad
Professor Mats G. Larson
Professor Ragnar Larsson

Professor Trond Kvamsdal
Professor Erik Burman
Professor Anders Logg

Professor Kjell M. Mathisen
Professor Ole Sigmund
Professor Rolf Stenberg

Professor Adil Rasheed
Professor Jens H. Walther
Professor Pekka Neittaanmäki

Professor Jianying He
Professor Peter Hansbo
Research Coordinator Tero Tuovinen

Professor Mats G. Larson
Professor Johan Hoffman
Professor Reijo Kouhia

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Professor Jianying He
Professor Peter Hansbo
Research Coordinator Tero Tuovinen

Professor Mats G. Larson
Professor Johan Hoffman
Professor Reijo Kouhia

SCIENTIFIC COMMITTEES

Chairs of the Technical Committees

Odd S. Hopperstad (Computational Solid Mechanics)
Computational material mechanics, i.e., plasticity and ductile fracture.

Jens. H. Walther (Computational Fluid Dynamics)
Efficient algorithms for Nano- and macros-scale fluid dynamics.

Zhiliang Zhang (Computational Natural Sciences)
Fracture and damage of materials and nanomechanics in general.

Pekka Neittaanmäki (Computational Applied Mathematics)
Numerical analysis and development of mathematical software

Anders Logg (Scientific Computing)
Development of open source codes for scientific computing.

Marie E. Rognes (Young Investigators Initiative)
Numerical analysis and computational biomedicine.
The conference facilities are located in the premises of the complex made up of the NOVA Spektrum and the Thon Hotel Arena directly adjacent to it.

Nova Spektrum is 10 min walk from Lillestrøm Station, between Oslo Central Station and Oslo International Airport. Easy access whether you are coming by train, car or bus. 10 minutes by train from the airport and Central Station. Trains normally depart from Platform no 11 at Oslo Central Station.

**TRAIN**

Vy has several departures per hour from both Oslo and Gardermoen station. Journey time from Oslo Central Station (Oslo S) is 11 and 12 minutes from Oslo Airport.

**FLYOGET – Airport Train**

For travel to/from the Oslo Airport at Gardermoen it is convenient to use the airport train (Flytoget) that takes 12 minutes between the airport and Lillestrøm and 19 minutes between the airport and Oslo Central Station. Notice that it is not possible to take the airport train for travelling to/from Oslo Central Station and Lillestrøm.
ROOMS AT THE NOVA SPEKTRUM

Ground Level

The main entrance is the Entrance West that get you straight to the Registration Area. This floor houses the Plenary Lectures and Semi-Plenary Lectures Room (B3+B4), the Coffee Break area (inside Hall B1 and B2) and the following meeting rooms: A1, A2, A3, A4, A5, A6, B1 and B2.

First Floor - Corridor

This floor is accessible by stairs and lift and also from the Thon Hotel Arena, houses the second room for Semi Plenary Lectures (Svalbard) and the following meeting rooms: Jan Mayen 1, Jan Mayen 2, Jan Mayen 3, Lounge A2, Spitsbergen, O-3, O-4.
ROOMS AT THE THON HOTEL ARENA

The Thon Hotel Arena is directly connected to the Nova Spektrum and it is also accessible from the main entrance of the hotel. We are using 14 meeting rooms.

Ground Floor

Hedmark, Nordland, Oslo 1, Oslo 2, Rogaland, Romerike and Nord - Norge where the Semi-Plenary Lectures will be addressed.

First Floor

Akershus, Buskerud, Hordaland 1, Hordaland 2, Oppland, Vestfold

CONFERENCE INFORMATION

Registration and Check in

All attendees are required to check in at the registration desks, located in the registration area, at Nova Spektrum.

Identification Badge

Participants are kindly requested to always wear their personal badges in the congress area. Access to coffee breaks and technical sessions will be denied in absence of the badge. Please remember to bring the badge with you every day, a duplicate will cost you 80€.

Please recall also that the badge should be returned to the secretariat at the end of the Congress, before you leave the venue. This is due to sustainability, in particular, in order to reduce the plastic waste.

Accompanying persons are not allowed to attend technical sessions.

Secretariat Timetable

Sunday, June 5: 16:00 - 20:00
Monday, June 6: 07:30 - 18:00
Tuesday, 7, Wednesday 8: 08:30 - 17:00
Thursday, June 9 15: 09:00 - 16:30

Conference website & Programme updates: [www.eccomas2022.org](http://www.eccomas2022.org)

The Congress organisers have arranged to include NFC keychains for all the registered participants of the ECCOMAS Congress 2022. The keychain has an NFC chip inside; this chip allows wireless communication with your smart phone.

After holding an NFC-capable smartphone near the keychain, the contents about the scientific programme of the Congress and last minute information will pop-up on the screen.

Presentations

Time and Equipment:

- Plenary Lectures will last 45 minutes with no gap within lectures.
- Semi-Plenary Lectures will last 30 minutes with no gap within lectures.
- Technical Sessions will last 2 hours.
CONFERENCE INFORMATION

The format will consist of:

- Sessions with a Keynote Lecture (KL): KL presentation (40 minutes) plus 4 presentations of 20 minutes each. Time includes Q&A.
- Sessions without a Keynote Lecture: 6 regular presentations (20 minutes each). Time includes Q&A.
- Sessions during the second afternoon blocks (16:30 to 18:30) scheduling 7 presentations will end at 18:50.

The conference will not provide computers for presentations. Speakers are kindly requested to bring and use their own laptop. An LCD projector will be present in each room. Please test your laptop with the projector in your session room during the coffee-break before your presentation.

The connector available on the projector will be HDMI. You should make sure your laptop has an HDMI port designated as your default output connection. Also note that if your computer does not have an HDMI port, we kindly request you to bring your own adapter

Coffee Areas

Coffee will be served inside Hall B1/B2 and outside Svalbard and Jan Mayen 1-2-3 at Nova Spektrum and also outside Oslo 1 and 2, Rogaland and Hordaland 1-2 at Hotel Thon Arena.

Lunch Options

Lunch Bags
Lunch bags previously booked can be collected in the Hall B1/B2.

Eating out at the Venue

Thon Hotel Arena is serving a full “Scandinavian Lunch Buffet” and there will be small restaurants at NOVA Spektrum serving different styles of lunch food. Furthermore, you can have some Poke bowls at the Food Box shop or at the Bakery inside the venue.

Social Events

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<th>Sunday, June 5</th>
<th>Monday, June 6</th>
<th>Thursday, June 9</th>
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<td>18:00 - 20:00</td>
<td>19:00-21:00</td>
<td>Aperitif 18:30-19:20</td>
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<tr>
<td>Icebreaking drink</td>
<td>Welcome Reception</td>
<td>(B3 and B4)</td>
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<tr>
<td>Nova Spektrum</td>
<td>Nova Spektrum</td>
<td>Congress Banquet 19:30-23:00</td>
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<td></td>
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<td>(Hall E)</td>
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SOCIAL PROGRAMME

The social events of ECCOMAS 2022 coincide with the Icebreaking reception, the Welcome Cocktail and the Conference Banquet. They are included in the registration fees but you should confirm your attendance in your personal records. Accompanying persons can join these events by purchasing a ticket at the cost of 200€.

Ice breaking reception

Sunday June 5th afternoon
18:00 to 20:00
Nova Spektrum Registration area

Welcome reception

Monday June 6th
19:00 to 21:00
Nova Spektrum Hall B3-4

 Spend a nice evening with colleagues and friends while enjoying Scandinavian Finger-buffet together with matching wines from famous European wine regions.

Conference banquet

Thursday June 9th
18:30 - 19:30 - Aperitif served at B3 and B4
19:30 - 23:00 - Dinner served at Nova Spektrum Hall E

The ECCOMAS Congress 2022 Banquet will be held in Hall E at Nova Spektrum. You will be served a three-course gourmet dinner with excellent Norwegian foods paired with matching wines from famous European wine regions.
SCIENTIFIC PROGRAMME

Introduction

Close to 2000 abstracts have been received, resulting in more than 1700 technical presentations across computational solid and fluid mechanics, coupled problems, and associated numerical and computational techniques. The vast majority of these presentations are part of the 139 mini-symposia that have been organised by the scientific community but the programme also includes 6 plenary and 32 semi-plenary lectures, 60 Keynote Lectures, the EYIC Young Investigators Minisymposium, the 12th PhD ECCOMAS Olympiad, 7 Special Technological Sessions and 4 contributed sessions.

A short guide to the Scientific Programme

Opening Ceremony: The conference will commence at 9:00 a.m, on Monday, June 6.

Plenary lectures will be delivered on Tuesday, Wednesday and Thursday in the morning in the B3+B4 Room.

Semi-Plenary lectures will be delivered on Tuesday and Thursday in the afternoon (right after lunch time).

EYIC Young investigators MS is schedule on Monday, June 6.

The 12th PhD ECCOMAS Olympiad is scheduled on Wednesday, June 8, in the afternoon.

Programme Updates: For the most updated version of the programme please view the online version on the conference website: www.eccomas2022.org and the NFC keychains you have received at the registration desk.

Technical Sessions for oral presentations will last 2 hours. The regular format will consist of:

- Sessions without a Keynote Lecture: 6 regular presentations (20 minutes each including Q&A).
- Sessions with a Keynote Lecture (KL): KL presentation (40 minutes) + 4 presentations of 20 minutes each. Time includes Q&A.
- Sessions during the second afternoon blocks (16:30 to 18:30) scheduling 7 presentations will end at 18:50.

Rooms Location:

All the presentations will take place in the premises of the complex made up of NOVA Spektrum and the Thon Hotel Arena directly adjacent to it.

Programme Overview

<table>
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<th>Monday</th>
<th>Tuesday</th>
<th>Wednesday</th>
<th>Thursday</th>
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<tbody>
<tr>
<td>09:00 - 10:30</td>
<td>Opening Ceremony</td>
<td>PL1</td>
<td>PL2</td>
<td>PL3</td>
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<tr>
<td>10:30 - 11:00</td>
<td>Coffee Break</td>
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<tr>
<td>11:00 - 13:00</td>
<td>MS / CS 1</td>
<td>MS / CS 4</td>
<td>MS / CS 6</td>
<td>MS / CS 9</td>
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<td>13:00 - 14:00</td>
<td>Lunch Time</td>
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<tr>
<td>14:00 - 16:00</td>
<td>MS / CS 2</td>
<td>SPL 1 - 4</td>
<td>MS / CS 7</td>
<td>SPL 5 - 8</td>
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<tr>
<td>16:00 - 16:30</td>
<td>Coffee Break</td>
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<tr>
<td>16:30 - 18:30</td>
<td>16:30-20:00 Registration</td>
<td>MS / CS 3</td>
<td>MS / CS 5</td>
<td>MS / CS 8</td>
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<tr>
<td>18:00-20:00 Ice-breaking reception</td>
<td>19:00 - 21:00 Welcome Reception</td>
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<tr>
<td>18:30 - 19:30 Aperitif</td>
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<tr>
<td>19:30 - 23:00 Congress Banquet</td>
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Session Codes

OC: Opening Ceremony
PL: Plenary Lecture
SPL: Semi-Plenary Lecture
MS: Minisymposium
CS: Contributed Session
STS: Special Technological Session
YIMS: EYIC Young Investigators Minisymposium
CF: EYIC Career Forum
JW: EYIC Junior workshop
ECO: ECCOMAS Olympiad

Green rooms are located at the Thon Hotel Arena
Yellow rooms are located at the NOVA Spektrum Center
**Plenary Lectures overview**

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<tr>
<th>Tuesday</th>
<th>Wednesday</th>
<th>Thursday</th>
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<tbody>
<tr>
<td>Pål G. Bergan</td>
<td>George Karniadakis</td>
<td>Annalisa Buffa</td>
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<tr>
<td>Thomas J.R. Hughes</td>
<td>David Keyes</td>
<td>Paul Steinmann</td>
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**Plenary Speakers**

- **07 June 2022 09:00 - 10:30**
  - Pål G. Bergan
  - NTNU, Norway
  - Computational mechanics and the green transition: motivation and examples

- **09 June 2022 09:00 - 10:30**
  - Annalisa Buffa
  - École Polytechnique Fédérale de Lausanne, Switzerland
  - The impact of defeaturing on the accuracy of PDE solutions

- **07 June 2022 09:00 - 10:30**
  - Thomas J.R. Hughes
  - University of Texas at Austin, USA
  - The Finite Element Method and Computational Mechanics: Past, Present and a Vision of the Future

**Semi-Plenary Lectures overview**

<table>
<thead>
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<th>Tuesday</th>
<th>Thursday</th>
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<tbody>
<tr>
<td>Christopher Pain</td>
<td>Harald Van Brummelen</td>
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<tr>
<td>Paola Goatin</td>
<td>Carmen Rodrigo Cardiel</td>
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<tr>
<td>Jianying He</td>
<td>Massimiliano Cremonesi</td>
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<tr>
<td>Anna Pandolfi</td>
<td>Andrea Walther</td>
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<tr>
<td>Olaf Steinbach</td>
<td>Garth Wells</td>
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<tr>
<td>Daniel Peterseim</td>
<td>Tarek Zohdi</td>
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<tr>
<td>Donatella Marini</td>
<td>Thomas J.R. Hughes</td>
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<tr>
<td>Dennis Kochmann</td>
<td>David Keyes</td>
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<tr>
<td>Odd Sture Hopperstad</td>
<td>Paul Steinmann</td>
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<tr>
<td>Sanjay Mittal</td>
<td>Odd Sture Hopperstad</td>
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<tr>
<td>Anna Pandolfi</td>
<td>Thomas J.R. Hughes</td>
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<tr>
<td>Christopher Pain</td>
<td>Paul Steinmann</td>
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<tr>
<td>Jerzy Rojek</td>
<td>Paul Steinmann</td>
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<td>Harald Van Brummelen</td>
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<td>Olaf Steinbach</td>
<td>Jan Martin Nordbotten</td>
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<tr>
<td>Andrea Walther</td>
<td>Yuri Bazilevs</td>
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<tr>
<td>Garth Wells</td>
<td>Andreas Logg</td>
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<td>Tarek Zohdi</td>
<td>Daniel Peterseim</td>
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<tr>
<td>Marie Elisabeth Rognes</td>
<td>Andrea Walther</td>
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**Semi-Plenary Speakers**

- **Niels Aage**
  - Technical University of Denmark
  - On the usefulness of ultra-high resolution topology optimization methods

- **Massimiliano Cremonesi**
  - Politecnico di Milano, Italy
  - Lagrangian approaches for free-surface fluid flows and fluid-structure interaction problems

- **Jianying He**
  - Norwegian University of Science and Technology (NTNU), Norway
  - Nanoscale thermal transport

- **Donatella Marini**
  - University of Pavia, Italy
  - Recent results on Virtual Element Methods

- **Christopher Pain**
  - Imperial College London, UK
  - Applying AI techniques to Model Fluid Flows

- **Thomas Richter**
  - Otto-von-Guericke University Magdeburg, Germany
  - Deep neural networks for accelerating fluid-dynamics simulations

- **Andrea Walther**
  - Humboldt University of Berlin, Germany
  - Adjoint-based optimization for industrial applications

- **Garth Wells**
  - University of Cambridge, UK
  - Computing at the Exascale

- **Tarek Zohdi**
  - UC Berkeley, USA
  - Modeling and Simulation Tools for Industrial and Societal Research Applications: Digital Twins and Genome-based Machine-learning
SPECIAL TECHNOLOGY SESSIONS

The Special Technology Sessions (STS) and their papers provide an overview on the state-of-the-art and future technologies in computational and digitalized methods and tools (modelling, simulation, optimisation and control, Artificial Intelligence (AI), etc.) for the application in aeronautics and other industries with related technology validations.

<table>
<thead>
<tr>
<th>Session</th>
<th>Title</th>
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<tbody>
<tr>
<td>STS01</td>
<td>The Combined Role of Modelling, Simulation, Optimization, Control and Digitalization for Solving New Computational Challenges of Aviation, Transport and Renewable Energy (Part 1 + 2)</td>
</tr>
<tr>
<td>STS03</td>
<td>Unsteady Simulation of High-Lift System Aerodynamics</td>
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<tr>
<td>STS04</td>
<td>Application of Hybrid Laminar Flow Control for Drag Reduction of Transport Aircraft</td>
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<td>STS05</td>
<td>Shock Wave Boundary Layer Interaction in Aeronautical Applications</td>
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<td>STS-06</td>
<td>Disruptive Aircrafts Wing Configurations towards Climate Neutrality</td>
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<td>STS-08</td>
<td>EU-Funded Research and Innovation on Computational Methods towards Climate Neutrality of Aviation</td>
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<tr>
<td>STS-10</td>
<td>Additive Manufacturing, Applications and Numerical Modelling</td>
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</table>

The STS Book of Abstract provides the STS abstracts with its content and rational and the presented paper abstracts of all STS. A PDF-copy of this STS Book of Abstracts can be downloaded on the conference website.

EYIC YOUNG INVESTIGATORS MINISYMPOSIUM

Organizers

Simone Morganti, University of Pavia, Italy
Carina Schwarz, University of Duisburg-Essen, Germany
Markus Lukacevic, Vienna University of Technology, Austria
Leo Nouveau, IRMAR/INSA, France

This minisymposium - scheduled on Monday - is organised by young investigators (all of which are members of the ECCOMAS Young Investigators Committee) for young investigators. The format, which has first been introduced at the ECCOMAS Congress 2016 with great success, is quite different from the regular minisymposia in order to particularly attract young researchers.

There will be three types for presentations:

1. Presentation in pairs

Two presenters prepare and submit their abstract together, and they also give the presentation together – whether as a “duet” or more as a “duel” is up to them. The two presenters know each other, but usually do not work at the same institution. The idea is to view a topic from two different perspectives, thus leading to intense discussions on pros and cons of the presented approaches. Presentations in pairs are allowed 1.5 times the time of regular talks.

2. Presentation of things that did not work (as expected)

This session is dedicated to those works that did not work or led to different outcomes than expected. This gives the chance to present “negative” results. Authors will discuss why things went “wrong” with the aim to prevent others from falling into the same traps.

3. Presentation of open / unsolved problems

The main idea of this scientific format is to present a problem that the speaker has been working on for quite some time, but for which he/she could not yet find a good solution. This gives the chance to present “unfinished” work and to get valuable input from an audience full of “fellow sufferers”. Authors will give a clear and comprehensive introduction to their unsolved problem, but allow for more time than usual to interact with the audience and to discuss suggestions.
12th PhD ECCOMAS OLYMPIAD

The purpose of the ECCOMAS PhD Olympiads is to present the best PhD Theses approved by a University or Research Organization in Europe during the previous year and to act as a forum for exchanging new ideas, disseminating recent developments in the fields of ECCOMAS and sharing common research interests among young investigators. Every National or Regional Association affiliated to ECCOMAS is represented by a number of selected PhDs submitted for consideration for the two ECCOMAS PhD Awards.

The Olympiad is scheduled on Tuesday, June 7

Tobias Bode, Leibniz University Hannover, Germany
David Codony, CIMNE, Spain
Erik Orvehed Hiltunen, Yale University, United States
Nikos Vasileiadis, University of Thessaly, Greece
Donatella Passiatore, Politecnico di Bari, Italy
Mohammad Reza Pendar, University of Beira Interior, Portugal
Ernesto Pimentel-García, University of Málaga, Spain
Marco Tezzele, University of Texas at Austin, United States
Marie Touboul, University of Manchester, United Kingdom
Michał Wichrowski, Universität Heidelberg, Germany

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Ramin Aghababaei, David Kammer and Lucia Nicola

MS9: BRAIN MECHANICS ACROSS SCALES
Silvia Budday, Kristian Franze, Jochen Guck and Paul Steinmann

MS15: ADVANCED COMPUTATIONAL DESIGN AND MANUFACTURING SIMULATION OF NOVEL MATERIALS AND STRUCTURES
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MS24: MULTI-SCALE MODELLING OF GENERALISED CONTINUA AND ARCHITECTURED MATERIALS
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Daniele Addessi, Andrea Bacigalupo, Maria Laura De Bellis and Francesco Fantoni

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Sebastian Pflier, Fabrice Detrez and Hans van Dommelen

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Tim Ricken, Oliver Rührle and Silvia Budday

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<td>Jan Mayen 1</td>
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<td>Jan Mayen 3</td>
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<td>Spitsbergen</td>
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Thon Hotel Arena  NOVA Spektrum Center

Sunday, June 5th

16:30 - 20:00  Registration at Nova Spektrum West entrance
18:00 - 20:00  Ice-breaking Reception at Nova Spektrum West entrance

Monday, June 6th

6/6/22 09:00 - 10:30  Opening Session  OS  Room: B3 + B4  Chair: Trond Kvamsdal

Welcome Addresses
ECCOMAS Awards: PhD Awards
Olgierd Cecil Zienkiewicz Award
Jacques Louis Lions Award
ECCOMAS Medals: The Prandtl Medal
The Euler Medal

10:30 - 11:00  Coffee Break

11:00 - 13:00  TECHNICAL SESSIONS

6/6/22 11:00 - 13:00  The Combined Role of Modelling, Simulation, Optimization, Control and Digitalization for Solving New Computational Challenges of Aviation, Transport and Renewable Energy I  STS01A  Room: Hedmark (GF)  Chair: Jaques Periaux

Grey-Box Modeling with Applications in Data-driven Turbulence Modeling  Nicolas R. Gauger
Rapid Aerodynamic Modelling at Airbus  Xavier Bertrand
Hybrid optimization methods applied to preliminary design of a wing  Marti Coma, Jordi Pons-Prats and Gabriel Bujeda
Multi-fidelity simulations for multidisciplinary design optimization  Alberto Clarich, Luca Battaglia, Lucia Parussini and Carlo Poloni
### Monday
#### Conference Programme & Technical Sessions

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<tr>
<th>Time</th>
<th>Session</th>
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<tbody>
<tr>
<td>11:00 - 13:00</td>
<td><strong>Isogeometric Methods I</strong>&lt;br&gt;Minisymposium organized by Alessandro Reali, Yuri Bazilevs, David J. Benson, René de Borst, Thomas J.R. Hughes, Trond Kvamsdal, Giancarlo Sangalli and Clemens V. Verhoosel</td>
<td>MS2A&lt;br&gt;Nord – Norge (GF)</td>
<td>Alessandro Reali</td>
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<td>Steps Towards Productive Use of IGA in LS-DYNA for Full Vehicle Crash Simulations (Keynote Lecture)&lt;br&gt;Lukas Leidinger, Stefan Hartmann, Attila Nagy, Liping Li, Lam Nguyen and Dave Benson</td>
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<td>Intrinsically selective mass scaling for isogeometric structural analysis&lt;br&gt;Bastian Oesterle, Lisa-Marie Krauß, Rebecca Thierer, Anton Tschukk and Monfred Bischoff</td>
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<td>Transverse shear parametrization in non-linear isogeometric shell analysis&lt;br&gt;Rebecca Thierer, Bastian Oesterle and Monfred Bischoff</td>
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<td>Isogeometric Impact Simulations Under Large Rotations in Flexible Multibody Systems&lt;br&gt;Tobias Rückwald, Alexander Held and Robert Seifried</td>
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<td>Towards IGA application on crushworthiness CAE analysis in the automotive industry&lt;br&gt;Lluis Martorell, Riccardo Rossi, Lucia Barbu and Eduardo Martin-Santos</td>
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<td>11:00 - 13:00</td>
<td><strong>Mathematical models and numerical methods for interface-coupled multiphysics problems I</strong>&lt;br&gt;Minisymposium organized by Ana Budisa, Miroslav Kuchař and Kent-André Mardal</td>
<td>MS150A&lt;br&gt;Nordland (GF)</td>
<td>Ana Budisa</td>
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<td>An integrated model of the human heart: coupling electrophysiology, solid mechanics and fluid dynamics&lt;br&gt;Michele Bucelli, Luca Dedè and Alfio Quarteroni</td>
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<td>3D-0D closed-loop model for the simulation of cardiac electromechanics&lt;br&gt;Roberto Pierson, Christian Vergara, Luca Dedè and Alfio Quarteroni</td>
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<td>Fluid-structure interaction of slender bodies immersed in three-dimensional flows: a new approach for mathematical modeling and numerical approximation&lt;br&gt;Fabien Lespagnol, Muriel Boulakia, Céline Grandmont, Paolo Zunino and Miguel-Ángel Fernández</td>
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<td>Boundary integral equation method in the coupled theory of double-porosity thermoelastic materials&lt;br&gt;Mehdi Sornayez</td>
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<td>Mathematical investigation of corrosion behavior of bioabsorbable metals on the biodegradation interface&lt;br&gt;Mohana Barzevičiūtė and Liesbet Geris</td>
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<td>11:00 - 13:00</td>
<td><strong>EYIC Young Investigators Minisymposium I</strong>&lt;br&gt;Minisymposium organized by Simone Morganti, Carina Schwarz, Markus Lukacevic and Léo Nouveau</td>
<td>YIM5A&lt;br&gt;Oslo 1 (GF)</td>
<td>Simone Morganti</td>
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<td>Interlaminar stress modeling of composite Kirchhoff plates combining immersed Isogeometric Analysis and equilibrium&lt;br&gt;Alessia Patton, Massimo Carraturo, Ferdinando Auricchio and Alessandro Reali</td>
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<td>Robust discretizations for poroelastic problems: engineering and mathematical points of views in a presentation in pairs&lt;br&gt;Maximilian Brodbeck and Fleurianne Bertrand</td>
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<td>Comparison of different numerical methods in biomedical applications I&lt;br&gt;Natalia Mañeda, Anna Skorupa, Grzegorz Kokot and Alicja Piaśecka-Belkhayat</td>
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<td>Comparison of different numerical methods in biomedical applications II&lt;br&gt;Natalia Mañeda, Anna Skorupa, Grzegorz Kokot and Alicja Piaśecka-Belkhayat</td>
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<td>On different discretisation strategies to solve the kinematical and equilibrium problem for masonry-like structures&lt;br&gt;Andrea Montanino, Carlo Olivieri, Daniela De Gregorio and Antonino Iannuzzo</td>
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<td>11:00 - 13:00</td>
<td><strong>Metamaterials Across the Scales: Modeling, Experiment and Simulation I</strong>&lt;br&gt;Minisymposium organized by Jörg Schröder, Varvara Kouznetsova, Dennis Kochmann, Marc-Andre Keip and Gerolf Hütter</td>
<td>MS53A&lt;br&gt;Oslo 2 (GF)</td>
<td>Jörg Schröder</td>
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<td>Wang tiles for exploring and manufacturing modular metamaterials (Keynote Lecture)&lt;br&gt;Ian Zeman</td>
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<td>Manipulation of acoustic wavefronts by resonator-based metasurface&lt;br&gt;Xharixa Kuci, Marc G.D Geers and Varvara G. Kouznetsova</td>
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<td>Two-scale asymptotic homogenization in a MEMS auxetic structure for over etch identification&lt;br&gt;David Ferras, Alessandro Nastro, Valentino Zega and Claudia Comi</td>
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<td>Architectured and additively manufactured double-negative index metamaterials&lt;br&gt;Claudia Almeida, João Cardoso, Pedro Coelho, Alexandre Velhinho and José Xavier</td>
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<td>Multiscale reduced-order model for metafoams&lt;br&gt;Renan Luquekevicius Carnevali, Hans van Dommelen, Marc Geers and Varvara Kouznetsova</td>
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### Challenges and progress in computational science and engineering: from industry 4.0 to sustainable development I

**Minisymposium organized by Matteo Giacomini, Simona Perotto and Gianluigi Rozza**

**Challenges and progress in computational science and engineering: from industry 4.0 to sustainable development I**

- **Minisymposium organized by Matteo Giacomini, Simona Perotto and Gianluigi Rozza**
- **Room:** Rogaland (GF)
- **Chair:** Matteo Giacomini
- **CoChair:** Simona Perotto
- **Talks:**
  - **36 37** Challenges and progress in computational science and engineering: from industry 4.0 to sustainable development I
  - **Minisymposium organized by Matteo Giacomini, Simona Perotto and Gianluigi Rozza**
  - **Room:** Rogaland (GF)
  - **Chair:** Matteo Giacomini
  - **CoChair:** Simona Perotto

### Model and Method Hierarchies for Biomedical Flow Simulation (Keynote Lecture)

**Marek Behr**

- **Title:** Model and Method Hierarchies for Biomedical Flow Simulation (Keynote Lecture)

### Deep Reinforcement Learning for fluid mechanics

**Elie Hachem, Philippe Meligo, Hassan Ghaisi, Ramy Nemer, Rudy Valette, Aurelien Larcher and Jonathan Viquerat**

- **Title:** Deep Reinforcement Learning for fluid mechanics

### Separation behaviour of small foreign objects in dry foods

**Shunsuke Takeda and Masato Saeki**

- **Title:** Separation behaviour of small foreign objects in dry foods

### Variational image segmentation on anisotropic adapted meshes for medical applications

**Nicola Ferro, Francesco Clerici, Simona Perotto, Stefano Micheletti, Stefania Marconi and Erika Negrello**

- **Title:** Variational image segmentation on anisotropic adapted meshes for medical applications

### HiFiMagnet: a toolchain for the design and simulation of high field magnets

**Christophe Trophime, Vincent Chabannes, Christophe Prud’Homme, Romain Hild and Fracnois Debray**

- **Title:** HiFiMagnet: a toolchain for the design and simulation of high field magnets

### 6/6/22 11:00 - 13:00

#### Biological fluid mechanics: modeling, simulation, and analysis I

**Minisymposium organized by Boyce Griffith, Sookkyung Lim and Sarah Olson**

**Room:** Sør – Norge (GF)

- **Chair:** Sarah Olson

- **Talks:**
  - **Simulations of fluttering leaves**
    **Shilpa Khatri, Nicholas Battista, Laura Miller and Matea Santiago**
  - **Flash or Sniff: Testing the evolutionary divergence of firefly antennae due to sexual selection**
    **Lindsay Waldman and Shilpa Khatri**
  - **Numerical Investigation of a 3D Dragonfly Wing Captured with a High-Resolution Micro-CT**
    **Vera Stelzer, Markus Rütten and Lars Krenkel**
  - **Swimming behavior of polarly-flagellated bacteria**
    **Sookkyung Lim, Yongsam Kim, Wanho Lee and Jeungeun Park**
  - **Hydrodynamic entrapment of uni-flagellated bacteria with flexible flagellum near a flat surface**
    **Vahid Nourian and Henry Shum**
  - **Effects of prey capture on the swimming and feeding performance of choanoflagellates**
    **Lisa Fauci, Hoa Nguyen, Emma Ross, Ricardo Cortez and M.A.R. Koehl**

### 6/6/22 11:00 - 13:00

#### Modelling and simulation of particles in contact I

**Minisymposium organized by Kristin M. de Payrebrune and Matthias Kröger**

**Room:** Romerike (GF)

- **Chair:** Kristin de Payrebrune
- **CoChair:** Matthias Kröger

- **Talks:**
  - **Particles in rubber contacts**
    **Matthias Kröger**
  - **Adhesion in rolling contact of a particle**
    **Qian Li and Valentin L. Popov**
  - **Investigation of the Contact Behaviour of a Tyre for Non-Steady Maneouvers by Means of Frustated Total Reflection**
    **Tobias Hellberg and Martin Meywerk**
  - **Simulation and experimental investigation of tire tread block wear in three-body contact**
    **Duc Nam Nguyen and Stephanie Kahms**
  - **The role of particles in the sealing contact of radial shaft seals**
    **Stefan Thielen, Tim Schollmayer and Oliver Koch**
  - **Interactions between the contact area and self-excited vibrations in a particle-solid system**
    **Thomas Fürstner and Matthias Kröger**

### 6/6/22 11:00 - 13:00

#### Multiscale modeling of concrete and concrete structures - in honor of the 80th birthday of Prof. Herbert A. Mang I

**Minisymposium organized by Bernhard Pichler, Yong Yuan and Günther Meschke**

**Room:** Akershus (1F)

- **Chair:** Bernhard Pichler

- **Talks:**
  - **A Critical Appraisal Of Peridynamics And Phase-Field Models In Light Of Gap Test And Classical Fracture Tests (Keynote Lecture)**
    **Zdenek Bazant, Hoang Nguyen and Abdullah Donmez**
  - **3D Finite Element Analysis of Time-Dependent Structural Failure of Concrete Beams in Bending due to Nonlinear Creep**
    **Alexander Dummer, Matthias Neuner and Günter Hofstetter**
  - **Static and dynamic analysis of concrete fracture using localizing gradient damage**
    **Adam Wosatko, Jerzy Pamin and Andrzej Winnicki**
  - **Thermodynamically consistent interface model of bond in reinforced concrete applicable to general loading conditions**
    **Abedulgader Baktheer, Mario Aguilar, Miroslav Vořechovský, Josef Hegger and Rostislav Chudoba**
  - **Physics-informed neural networks with trainable weighted loss using uncertainty: applications to inverse analysis of tunnel rings**
    **Chen Xu, Ba Trung Cao, Günther Meschke and Yong Yuan**
### Monday Conference Programme & Technical Sessions

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<td>6/6/22</td>
<td>11:00 - 13:00</td>
<td>UQ and data-driven methods for scale-resolving turbulent flow simulations I</td>
<td>MS155A, Buskerud (1F), Maria Vittoria Salvetti</td>
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<td>Minisymposium organized by Saleh Rezaeiravesh, Philipp Schlatter and Maria</td>
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<td>Vittoria Salvetti</td>
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<td>Chair: Maria Vittoria Salvetti</td>
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<td>Development of a data-driven wall-model for separated flows (Keynote Lecture)</td>
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<td>Margaux Boxho, Michel Rasquin, Thomas Toulorge, Grégory Dergham, Grégoire</td>
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<td>Winckelmans and Koen Hillevaart</td>
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<td>Effects of uncertainties of image-based material properties of great vessels</td>
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<td>on vascular deformation</td>
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<td>Benigno Marco Fanni, Maria Nicole Antonuccio, Giuseppe Santoro, Alessandro</td>
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<td>Mariotti, Maria Vittoria Salvetti and Simona Celi</td>
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<td>Quantifying Uncertainties in Direct Numerical Simulations of a Turbulent</td>
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<td>Channel Flow</td>
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<td>Joseph O'Connor, Sylvain Loizet, Andrew Wynn, Jon McCullough and Peter</td>
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<td>Quantification of time-averaging uncertainties in turbulence simulations</td>
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<td>Donatella Xavier, Saleh Rezaeiravesh, Ricardo Vinuesa and Philipp Schlatter</td>
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<td>Data-Driven Inference Design for the Bayesian Uncertainty Quantification of</td>
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<td>the Reactive Shock-Bubble Interaction</td>
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<td>Ludger Paehler and Nikolaus A. Adams</td>
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<td>6/6/22</td>
<td>11:00 - 13:00</td>
<td>Computations in Environmental and Geophysical Fluid Mechanics I</td>
<td>MS5A, Hordaland 1 (1F),</td>
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<td>Minisymposium organized by Clint Dawson, Ethan Kubatko and Eirik Valseth</td>
<td>Eirik Valseth, CoChair:</td>
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<td>Model Adaptivity – Combining Hydrostatic And Non-Hydrostatic Shallow Water</td>
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<td>Modeling</td>
<td>Ethan Kubatko</td>
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<td>(Keynote Lecture)</td>
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<td>Jörn Behrens</td>
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<td>An adaptive model for meteotsunamis</td>
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<td>Nicole Beisiegel and Jörn Behrens</td>
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<td>Comparison of Lax-Wendroff numerical schemes solving conservative and non-</td>
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<td>conservative Boussinesq equations to an operational code</td>
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<td>Aurore Cauquis, Mario Ricchiuto and Philippe Heinrich</td>
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<td>Influence of the turbulent wake downstream offshore wind turbines on</td>
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<td>larval dispersal: development of a new Lagrangian-Eulerian model</td>
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<td>Souha Ajmi, Martial Bouet, Anne-Claire Dennis and Jean-Claude Dauvin</td>
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|            |              | Propagation of acoustic and gravity waves in the ocean: a new derivation for貌似是一个日文的表达式，可能是一个日期或时间。
### MONDAY

#### CONFERENCE PROGRAMME & TECHNICAL SESSIONS

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<tr>
<td>6/6/22</td>
<td>11:00 - 13:00</td>
<td><strong>Modeling of wetting and dewetting phenomena on smooth, rough, and patterned substrates</strong></td>
<td>MS89A</td>
<td>Mohammad R. Hashemi</td>
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<td>Mini symposium organized by Mohammad R. Hashemi and Pavel B. Ryzhakov</td>
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<td>Reactive wetting versus non-reactive wetting</td>
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<td>Ensieh Yousefi, Youqing Sun, Anil Kunwar, Muxing Guo, Nele Moelans and David Seveno</td>
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<td>Simulating wetting of geometrically complex surfaces using the unstructured Volume-of-Fluid method</td>
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<td>Mohammad Hassan Aghazadeh, Mathis Fricke, Dieter Bothe and Tomislav Maric</td>
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<td>A 3D Enriched-FEM / Level-set framework for simulating droplet dynamics with contact-angle hysteresis</td>
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<td>Mohammad R. Hashemi, Pavel B. Ryzhakov and Riccardo Rossi</td>
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<td>A droplet-phase approach to solve thin film flows</td>
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<td>Anand Sundaresan, Pratik Suchde and Joerg Kuhnter</td>
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<td>Data-driven approaches as a possible means for modeling water transport in gas diffusion layer of fuel cells</td>
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<td>Pimel Ryzhakov, Mohammad R. Hashemi, Marc Nuñez, Riccardo Rossi, Olga Antonova and Artur Perovskii</td>
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<tr>
<td>6/6/22</td>
<td>11:00 - 13:00</td>
<td><strong>Mechanics of wood and biocomposites in engineering I</strong></td>
<td>MS21A</td>
<td>Markus Lukacevic</td>
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<td>Mini symposium organized by Ani Khalfian, Markus Lukacevic and Jan-Willem van de Kuijlen</td>
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<td>Ani Khalfian</td>
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<td>Asymptotic homogenization of the effective hygro-elastic response of oak based on microscopic images</td>
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<td>Mohammadamin Livani, Emanuela Bosco and Akke S.J Suiker</td>
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<td>Computed tomography-based modelling of moisture transport and hygro-mechanical behavior of sawn timber during kiln drying</td>
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<td>Sara Florisson, Lars Hanson, Johannes Huber, José Couceiro and Dick Sandberg</td>
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<td>Wood feature reconstruction for simulations using x-ray computed tomography data</td>
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<td>Johannes A. J. Huber, Olof Broman, Johan Qj and Lars Hanson</td>
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<td>Micromechanics of biocomposites: Stiffness upscaling from cellulose nanofibrils to natural fibers and their composites</td>
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<td>Markus Königshofer, Markus Lukacevic and Josef Füssi</td>
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<td>Predicting the mechanical behaviour of a natural composite: the flax fibre</td>
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<td>Emmanuel Richey, Hom Dhakal, Zhongyi Zhang, Johnny Beaugrand and Sofiane Guessauma</td>
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<td>6/6/22</td>
<td>11:00 - 13:00</td>
<td><strong>Model order reduction - Challenges in engineering and industrial applications I</strong></td>
<td>MS72A</td>
<td>Karen Veroy</td>
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<td>Mini symposium organized by Annika Robens-Radermacher, Wil Schilders, Karen Veroy and Chady Ghnatios</td>
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<td>State of the art and perspectives for reduced order methods in industrial computational fluid</td>
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<td>dynamics (Keynote Lecture)</td>
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<td>Gianluigi Rozza</td>
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<td>Stability Analysis of Reduced Basis Model Predictive Control for Parametrized Optimal Control</td>
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<td>Problems</td>
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<td>Saskia Dietze and Martin Grepl</td>
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<td>Nonlinear Reduced Modelling based on Optimal Transport Metrics</td>
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<td>Minh-Hieu Do, Jean Feydy and Olga Mula</td>
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<td>Model order reduction of solidification problems</td>
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<td>Florian Arbus, Øyvind Jensen and Kent-Andre Mardal</td>
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<td>Accelerated nonlinear PDE-constrained optimization by reduced order modelling</td>
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<td>Benjamin F. Gibson and Mosayuki Yano</td>
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<td>6/6/22</td>
<td>11:00 - 13:00</td>
<td><strong>Modeling and simulation of highly flexible slender structures I</strong></td>
<td>MS161A</td>
<td>Damien Durville</td>
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<td>Mini symposium organized by Martin Arnold, Olivier Brühns, Elena Celledoni, Brynjulf Owen, Damien Durville, José Escalona, Johannes Gerstmayr, Gordon Jelenic, Sigrid Leyendecker, Joachim Linn, Tomaz Šuštar, Olivier Thomas and Dejan Zupan</td>
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<td>Pure bending in non-linear elasticity - analytical solution for a family of elastic materials in 2d continuum mechanics</td>
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<td>Gordon Jelenic</td>
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<td>A high-order finite element formulation for nonlinear computation of cables</td>
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<td>André Hildebrandt, Prateek Sharma, Stefan Diebels and Alexander Düster</td>
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<td>Homogenization of the constitutive properties of composite beam cross-sections</td>
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<td>Martina Stavole, Rodrigo T. Sato, Margus Lohk and Sigrid Leyendecker</td>
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<td>Modeling the Effective Inelastic Behavior of Multi-Wire Cables Under Mechanical Load Using Finite Elements</td>
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<td>Mohammad Hovawash, Vanessa Dörlich, Joachim Linn, Roger Keller and Ralf Müller</td>
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<td>Data-based inelastic constitutive models in the framework of Cosserat rods</td>
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<td>Davide Manfredo, Vanessa Dörlich, Joachim Linn and Martin Arnold</td>
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<td>Computational homogenization of spiral strands using 1d finite strain beam elements</td>
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<td>Mohammad Ali Saadat and Damien Durville</td>
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### Innovative Methods for Fluid-Structure Interaction I

6/6/22 11:00 - 13:00  
**Minisymposium organized by Harald van Brummelen, Trond Kvamsdal and Roger Ohayon**  
**Room:** A1 – 4  
**Chair:** Harald van Brummelen

**On the accuracy of Robin-type loose coupling for FSI (Keynote Lecture)**  
Erik Burman, Rebecca Durst, Miguel A. Fernández and Johnny Guzmán

Waveform relaxation methods for thermal fluid structure interaction  
**Philipp Birken**, Peter Meisrimel and Nikolai Kotarsky

A Quasi-Newton-Accelerated Robin-Neumann Scheme for Fluid-Structure Interaction  
**Thomas Spenke**, Michel Moeck and Norbert Hosten

Second-order accurate staggered schemes for fluid-structure interaction based on Dirichlet-Neumann coupling  
**Eman Alhayk**, Wulf G. Dettmer and Djordje Perić

### Simulations of Polymers and Polymer Composites I

6/6/22 11:00 - 13:00  
**Minisymposium organized by Sebastian Pfaller, Fabrice Detrez and Hans van Dommelen**  
**Room:** A1 – 5  
**Chair:** Fabrice Detrez

Nonlinear viscoelastic behavior of polymer nanocomposites: Coarse-grained-based predictions and experimental validation  
**Atiyeh Mousavi**, Behrouz Arash, Max Jux and Raimund Rolfes

Domain-decomposition simulations of polymers  
**Sebastian Pfaller**

An adaptive multiscale coupling method for thermoplastic polymers  
**Christof Bauer** and **Sebastian Pfaller**

Molecular mechanisms involved in treatment of waterlogged archaeological wood with polyethylene glycol: A hybrid Monte Carlo and molecular dynamics study  
**Ali Shamati**, Chi Zhang, Benoit Coasne, Eleanor J. Schofield, Dominique Derome and Jan Carmeliet

An atomistic-to-continuum coupling method for fracture simulations of amorphous polymers  
**Wuyang Zhao**, Paul Steinmann and **Sebastian Pfaller**

From self-assembly to mechanical behaviour: a computational data-driven framework for block copolymers  
**Aravinthen Rajkumar**, Peter Brommer and Lukasz Figiel

### Advanced Computational Design and Manufacturing Simulation of Novel Materials and Structures I

6/6/22 11:00 - 13:00  
**Minisymposium organized by Eric Li, Bing Li, ZC He, QQ Li, Fei Wu, ZQ Zheng and Yi Wu**  
**Room:** A1 – 6  
**Chair:** P. Antolin

Multiscale isogeometric design of lattice structures  
**Thibaut Hirschler**, Pablo Antolin and Annalisa Buffa

Shape and size optimization of a complex extruded aluminium profile for protection of battery trays in electric vehicles  
**Debora Obkircher**, Miguel Costas, Tore Barsvik and Odd Sture Hopperstad

Modular-topology optimization of structures and mechanisms: a free-material optimization-based heuristics  
**Marek Tykoł**, Martin Döskl, Jan Zeman and Martin Kružík

Assessment of some integration methods for an evolution equation based high-cycle fatigue model  
**Juha Jeronen**, Reijo Kouhia, Jonas Lohtinen and Heikki Orelma

A machine learning-based soft finite element method  
**Van Dung Nguyen**, Sara Garzon-Hernandez, Pablo S. Naharro, Jose M. Peña and Antoine Jérusalem

Further development of a simulation model for the description of the crystallization kinetics of semi-crystalline thermoplastics in additive manufacturing  
**Felix Winkelmann** and **Robert Hein**

### Uncertainty Quantification in material sciences I

6/6/22 11:00 - 13:00  
**Minisymposium organized by Florent Pled, Christophe Desceliers, Maarten Arnst and Christian Soize**  
**Room:** B1 – 1  
**Chair:** Florent Pled  
**CoChair:** Maarten Arnst

Phase Field Model for Brittle Fracture in Random Heterogeneous Elastic Media: Forward Numerical Simulations and Sensitivity Analysis  
Idiris Satgun, Florent Pled and Christophe Desceliers

Numerical model of the variability of particulate filled structural adhesive behaviour and failure in tension  
**Lorraine Aparecida Silva**, Christine Espinosa, Eric Paroissien, Frédéric Lachaude and Lucas F.M. da Silva

Probabilistic modeling of LCF failure times using an epidemiological crack percolation model  
**Mathis Harder**, Philipp Lion, Lucas Made, Tilman Beck and Hanni Gottschalk

Dynamic simulation of viscoelastic stochastic structures using time-separated stochastic mechanics  
**Hendrik Geisler**, Jan Nagel and Philipp Junker

A modular non-linear stochastic finite element formulation for uncertainty estimation in contact mechanics  
**Yanis Ammouche** and Antoine Jérusalem

Simulation of an additive manufacturing process considering process and material uncertainties using a voxel-based approach  
**Albrecht Schmidt** and **Tom Lahmer**
CONFERENCE PROGRAMME & TECHNICAL SESSIONS

6/6/22  11:00 - 13:00
Advanced Techniques for Coupled Problems I
Minisymposium organized by Markus Bause and Florin Adrian Radu
Chair: Markus Bause
CoChair: Florin A. Radu

Analysis and approximation of mixed-dimensional pdes on 3d-1d domains coupled with lagrange multipliers (Keynote Lecture)
Luca Heltai, Miroslav Kuchta, Kent-Andre Mardal and Paolo Zunino

Efficient solution of heart-torso coupled problems through DEIM-based data projection across non-conforming interfaces
Elena Zappon, Andrea Manzoni and Alfio Quarteroni

Efficient parametric derivative computations of the pressure in an acoustic cavity with immersed structures
Antoine Legay and Luc Laurent

Decoupling time integration methods for coupled elliptic-parabolic systems
Robert Altmann, Abdullah Mujahid and Benjamin Unger

6/6/22  11:00 - 13:00
Complex fluid flow in engineering: modeling, simulation and optimization I
Minisymposium organized by Fabian Key, Marek Behr and Stefanie Elgeti
Chair: Marek Behr

Analysis of Shear-thinning Planar Flows
Jaewook Nam, Hyungyeol Kwak and Nayeon Park

Numerical simulation of pipelines sinking and floatation in a liquefied sand
Massimiliano Cremonesi, Gabriele Della Vecchia and Federico Pisanò

Polytopal discontinuous Galerkin approximation of the fully-coupled thermo-poroelastic problem
Paola F. Antonietti, Stefano Bonetti and Michele Botti

Recovering equilibrating tractions on conforming hexahedral elements in the cgFEM framework
M. Bosch-Galera, EAW Mautner, F. Nardi, J.J. Ródenas and J.M. Navarro-Jiménez

6/6/22  11:00 - 13:00
Recent advances in immersed boundary and fictitious domain methods I
Minisymposium organized by Alexander Idesman, Guglielmo Scovazzi, Antonio Lorese, Riccardo Rossi, André Massing, Santiago Badia and Francesc Verdugo
Chair: Guglielmo Scovazzi

The Inverse Finite Cell Method for Structural Identification (Keynote Lecture)
Tim Büchner, Philipp Kopp, Stefan Kollmannsberger and Ernst Bank

A cut finite-element method for fracture and contact problems in large-deformation solid mechanics
Mikhail Poluektov and Lukasz Figiel

A Cut Finite Element Method for Ionic Electrodiffusion Problems on Resolved Cell Geometries
Nonna Berre, André Massing and Marie Rognes

Multi-GPU speedup of an iterative time-harmonic wave solver
Christian C. Stolk

6/6/22  11:00 - 13:00
Robust and scalable numerical methods for wave propagation: design, analysis and application I
Minisymposium organized by Hélène Barucq, Théophile Chaumont-Frelet, Rizia Djellouli and Axel Modave
Chair: T. Chaumont-Frelet
CoChair: A. Modave

Virtual element method for solving boundary integral equations of electromagnetic scattering at a perfectly conducting body
Alexis Touzalin, Ermalje Kacea and Sébastien Pernet

High-frequency estimates on boundary integral operators for the Helmholtz exterior Neumann problem
Jeffrey Galkowski, Pierre Marchand and Euan Spence

A Hybrid High-Order Method for the Indefinite Time-Harmonic Maxwell Problem
Matteo Cicuttin and Christophe Geuzaine

Spectral coarse spaces for indefinite and non-self adjoint problems
Niels Bootland, Victoria Dolejší, Vani G. Graham, Chupeng Ma and Robert Scheichl

Multi-GPU speedup of an iterative time-harmonic wave solver
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**CONFERENCE PROGRAMME & TECHNICAL SESSIONS**

**6/6/22 11:00 - 13:00**

**Deep Learning Approaches for Applied Sciences and Engineering I**

Minisymposium organized by M. Giselle Fernández-Godino, Charles F. Jekel and Christian Gag

- MS117A
  - Room: Jan Mayen 3
  - Chair: M. Giselle Fernandez-Godino
  - CoChair: Charles F. Jekel

  Simulation of reacting flows using artificial neural networks: application to multi-regime combustion
  Cédric Mehl and Damien Aubagnac-Karkar

  Neural network-based filtered drag model for cohesive gas-particle flows
  Josef Toussendshaus, Stefan Radl and Sankaran Sundaresan

  Using conservation laws to infer deep learning model accuracy of Richtmyer-Meshkov instabilities
  Charles F. Jekel, Dane M. Sterbentz, Sylvie Aubry, Youngsoo Choi, Daniel A. White and Jonathan L. Belof

  Deep Convolutional Autoencoders for Predicting Wind-Driven Spatial Patterns
  M. Giselle Fernández-Godino, Donald D. Lucas and Qingkai Kong

  Approximating the full-field temperature evolution in 3D electronic systems from randomized "Minecraft" systems
  Monika Stipsitz and Helios Sanchis-Alepuz

  Estimating geomechanical parameters from hydraulic fracturing tests using a soft computing-based methodology
  Rafael Abreu, Cristian Mejía and Deane Roehl

**6/6/22 11:00 - 13:00**

**Continuum Biomechanics of Active Systems I**

Minisymposium organized by Tim Ricken, Oliver Rohrle and Silvia Budday

- MS37A
  - Room: Lounge A2
  - Chair: Tim Ricken
  - CoChair: Lena Lambers

  A coupled multiphysics approach for modelling in-stent restenosis (Keynote Lecture)
  Stefanie Reese, Kiran Marajunatha, Marek Behr and Felix Vogt

  A Multiphysics Continuum Model for In-Stent Restenosis
  Meike Gierig, Peter Wriggers and Michele Marino

  Multiscale Simulation of Active Biological Multiphase Tissue
  Tim Ricken, Lena Lambers, Franziska Egli and Seyed Morteza

  A Multiscale and Multiphase, Data- and Knowledge-Driven Simulation of Function-Perfusion Processes in the Human Liver
  Lena Lambers, Steffen Gerhäuser, Luis Mandl, André Mielke and Tim Ricken

  Modelling of advection-diffusion transport in liver tissue using the homogenization approach
  Eduard Rohan, Vladimir Lukes and Jana Camprova Turjanicova

**6/6/22 11:00 - 13:00**

**Machine Learning and Data-Driven Approaches for Aerodynamic Analysis and Uncertainty Quantification**

Minisymposium organized by Esther Andrés

- MS86A
  - Room: Spitsbergen
  - Chair: Esther Andrés

  Data-Driven Reduced Order Modeling for Aerodynamic Flow Predictions
  Derrick A. Hines Chaves and Philipp Bekemeyer

  Comparison of uncertainty quantification methods for mathematical and mechanical problems in intermediate dimensions
  Jacques Peter and Quentin Bennehard

  A comparison of machine learning methods for pressure coefficient prediction of an aeronautical configuration
  Alejandro Gorgues, Rodrigo Castellanos, Jaime Bowen and Esther Andrés

  Reynolds stress correction by machine learning methods with physical constraints
  Thomas Philibert, Andrea Ferrera, Angelo Iollo and Francesco Larocca

  MPI-Parallel Machine Learning Algorithms for the Analysis of High-Speed Video Data
  Alexander Ruetgers and Anna Petrarolo

  Neural network prediction of the flow field in a periodic domain with hyper-neural network parametrization
  Ondřej Bublík, Václav Heilker, Aleš Pecka and Jan Vimmr

**6/6/22 11:00 - 13:00**

**Multiscale Computational Homogenization for Bridging Scales in the Mechanics and Physics of Complex Materials I**

Minisymposium organized by Julien Yvonnet, Kenjiro Terada, Peter Wriggers, Marc Geers, Karel Matouš and Paul Steinmann

- MS6A
  - Room: Svalbard
  - Chair: Julien Yvonnet

  A New Finite Strain Reduced Order Multiscale Formulation for Polycrystalline Materials
  (Keynote Lecture)
  Damin Xia and Caglar Ozkay

  Machine learning of evolving physics-based material models for fast and accurate concurrent multiscale modeling
  Iuri Roia, Pierre Kerfriden and Frans van der Meer

  Self-Adversarial Training for enhanced robustness of neural network based inelastic constitutive descriptions
  Julien Stoecker, Ferenc Leithenring, Alexander Fuchs and Michael Kaliske

  A FE-4 multiscale scheme for CNT-reinforced concrete accelerated by deep neural networks
  Stefanos Pyrialakos, Ioannis Kalogeris and Vissarion Papadopoulos

  An efficient training technique for teaching deep material networks to reproduce creep loading of short fiber-reinforced thermoplastics
  Argha Protim Dev, Fabian Welschinger, Matti Schneider, Sebastian Gajek and Thomas Boehlke
## CONFERENCE PROGRAMME & TECHNICAL SESSIONS

### 6/6/22 11:00 - 13:00

**Image-informed computational models and methods for prediction of cancer growth and treatment response I**

*Image-informed computational models and methods for prediction of cancer growth and treatment response I*

- **A Cahn-Hilliard Keller-Segel model for tumor growth with angiogenesis**  
  *Abramo Agosti, Alice Giotta Lucifero, Sabino Luzzi and Elisabetta Rocca*

- **Image-informed biomechanical model for glioblastoma growth: a combined descriptive and predictive model**  
  *Maryem Abdal Andaloussi, Andreas Hursch, Frank Hertel, Stéphane Urcun and Stéphane Bordin*

- **Fitting the evolution of glioma’s mean radius before and after radiotherapy with a simple biophysical model**  
  *Leo Adenis, Stephane Plaszczynski, Basile Grammaticos, Johan Pallud and Mathilde Badoual*

- **Patient-specific prediction of the growth of asymptotic meningiomas using spatial mechanistic modeling and deep learning**  
  *Annabelle Collin, Oliver Saut and Virginie Montalibet*

- **Modeling and simulation of vascular tumors embedded in evolving capillary networks**  
  *Marvin Fritz, Prashant K. Jha, Tobias Köppl, J. Tinsley Oden, Andreas Wagner and Barbara Wohlmuth*

- **Personalized computational forecasting of prostate cancer growth during active surveillance**  
  *Guillermo Lorenzo, Jon S. Heiselman, Michael A. Liss, Michael I. Miga, Hector Gomez, Thomas E. Yankeeov, Thomas J. R. Hughes and Alessandro Reali*

### 6/6/22 11:00 - 13:00

**Recent Advances in the Modelling of Architectured Metamaterials I**

*Minisymposium organized by Daniela Addessi, Andrea Bacigalupo, Maria Laura De Bellis and Francesca Fantoni*

- **Attenuation and localization of waves in taut cables with suspended masses**  
  *Marco Moscatelli, Claudia Comi and Jean-Jacques Marigo*

- **Design of piezoelectric lattice metamaterials**  
  *Nicola A. Nodargi, Claudio Intrigila and Paolo Bisegna*

- **Optimization of materials with desired nonlinear properties utilizing internal contact**  
  *Gore Lukas Bluhm, Konstantinos Poulios, Dennis Kochmann and Ole Sigmund*

- **Wave redirection and confinement via elastic meta-lattices**  
  *Jacopo Maria De Ponti, Luca Iorio, Raffaele Ardito and Alberto Corigliano*

- **Mathematical modeling and numerical results on the propagation of solitary waves on tensegrity lattices**  
  *Ada Amendola, Fernando Fraternali and Giuseppe Saccomandi*

### 13:00 - 14:00

**Lunch Time**

### 14:00 - 16:00 | TECHNICAL SESSIONS

### 6/6/22 14:00 - 16:00

**Shock Wave Boundary Layer Interaction in Aeronautical Applications I**

*STS05A  
Room: Hedmark (GF)  
Chair: Pawel Flaszynski*

- **Three decades of SBLI in European Research**  
  *Piotr Doerffer and Pawel Flaszynski*

- **Numerical tripping of supersonic/hypersonic boundary layers**  
  *Alessandro Ceci, Andrea Palumbo, Johan Larsson and Sergio Pirozzi*

- **Length and Time Scale Comparison in Different Transitional SBLIs**  
  *Mariadebora Mauriello, Lionel Lorchevéque and Pierre Dupont*

- **Numerical simulation and turbulence modelling of a 3D transonic regime around a supercritical wing involving strong separation**  
  *Cesar Jimenez Navarro, Nikolaos Simiriotis, Abderrahmane Marouf, Rajaa El Akoury, Clement Rouaux, Yannick Hoarau and Marianna Braza*

### 6/6/22 14:00 - 16:00

**Isogeometric Methods II**

*Minisymposium organized by Alessandro Reali, Yuri Bazilevs, David J. Benson, René de Borst, Thomas J.R. Hughes, Trond Kvamsdal, Giancarlo Sangalli and Clemens V. Verhoosel*

*MS29A  
Room: O - 4  
Chair: De Bellis Maria Laura  
CoChair: Bacigalupo Andrea*

- **Isogeometric collocation: A mixed displacement-pressure method for nearly incompressible elasticity in small and large deformations**  
  *Simone Mangani, Michele Torre, Frederik Fahrendorf, Laura De Lorenzis, John A. Evans, Thomas J.R. Hughes and Alessandro Reali*

- **A rigorous framework to explicitly enforce damage irreversibility in finite element and isogeometric computations of phase-field brittle fracture**  
  *Alessia Patton, Alessandro Marengo, Luigi Greco, Matteo Negri, Alessandro Reali and Umberto Perego*

- **NURBS-based isogeometric analysis of a bi-ventricular heart model**  
  *Robin Willems, Clemens V. Verhoosel and Olaf Slui*

- **Patch-wise Integration of Trimmed Surfaces**  
  *Michael Loibl, Leonardo Leonetti, Alessandro Reali and Josef Kiendl*

- **Numerical Quadrature for Gregory Quad4s**  
  *Jun Zhou, Pieter Barendrecht, Michael Barton and Jiri Kosinka*

- **Isogeometric analysis of industry applications with Geomiso SEA: a new hybrid software for shell analysis**  
  *Panagiotis Karakitsios, Vasiliiki Tzotoulidi, Panagiotis Kolios and George Mprellas*
### Mathematical models and numerical methods for interface-coupled multiphysics problems II

**Minisymposium organized by Ana Budisa, Miroslav Kuchta and Kent-Andre Mardal**

**Chair:** Miroslav Kuchta  
**CoChair:** Kent-Andre Mardal

- **6/6/22 14:00 - 16:00**
  - A new stabilization of Biot's consolidation model  
  **Carmen Rodrigo, Álvaro Pé de la Riva and Francisco J. Gaspar**
  - Hybrid Finite-Volume/Discontinuous Galerkin framework for the solution of Multiphysics problems using unstructured meshes  
  **Vladim Mathey, Panagiotis Tsoutsanis and Martin Skote**
  - Parameter-robust methods for the Biot-Stokes interfacial coupling without Lagrange multipliers  
  **Wietse M. Boon, Martin Hornikij, Miroslav Kuchta, Kent-André Mardal and Ricardo Ruiz-Baier**
  - Interface Preconditioners for Multiphysics Problems  
  **Xiaozhe Hu**
  - Robust software modules for modelling interfaces  
  **Ana Budisa, Miroslav Kuchta, Kent-Andre Mardal, Xiaozhe Hu, James Adler and Ludmil Zikatanov**

### EYIC Young Investigators Minisymposium II

**Minisymposium organized by Simone Morganti, Carina Schwarz, Markus Lukacovic and Léo Nouveau**

**Chair:** Markus Lakacevic  
**CoChair:** Enrique Nadal Soriano

- **6/6/22 14:00 - 16:00**
  - On the knotty effect of a single parameter on cardiac muscle simulations  
  **Michele Torre, Simone Morganti, Francesco Pasqualini and Alessandro Reali**
  - On mixed order approaches not working for goal oriented adaptivity in a space-time setting  
  **Jan Philipp Thiele and Thomas Wick**
  - Shifted boundary method and moving front for mixed formulation of phase change problems  
  **Tiffanie Carlier, Léo Nouveau, Heloise Beaugendre, Mathieu Colin and Mario Ricchiuto**
  - The influence of the Lennard-Jones-Potential in Steered Molecular Dynamics  
  **Julia Kamm and David Kammer**
  - Improved embedded methods for flow in fractured porous media  
  **Davide Lasagna and Anna Scotti**
  - Investigation of parameter-dependent material characteristics of additively manufactured specimens for data-driven part optimization  
  **Dominic Zettel, Piotr Breitkopf, Pascal Nicolay and Roland Willmann**

### Metamaterials Across the Scales: Modeling, Experiment and Simulation II

**Minisymposium organized by Jörg Schröder, Varvara Kouznetsova, Dennis Kochmann, Marc-Andre Keip and Gerolf Hütter**

**Chair:** Jörg Schröder

- **6/6/22 14:00 - 16:00**
  - Multiscale Optimization using Surrogate Constitutive Models for Programmable Mechanical Metamaterials  
  **Alexander Leichner, Tobias Lichti, Heiko Andrä, Franziska Wenz, Chris Eberl, Angela Schwarz and Christof Hübner**
  - Low-frequency band-gaps in solid/solid and solid/liquid seismic metamaterials  
  **Christoph Bös and Chuanzeng Zhang**
  - Elastic wave control via octet-based architected lattices  
  **Giulia Aguzzi, Andrea Colombi and Eleni Chatzi**
  - Comparative study of different finite element formulations for the relaxed micromorphic model  
  **Mohammad Sarhbi, Lisa Scheunemann, Patrizio Neff and Jörg Schröder**
### CONFERENCE PROGRAMME & TECHNICAL SESSIONS

#### 6/6/22 14:00 - 16:00

#### Biological fluid mechanics: modeling, simulation, and analysis II

*Minisymposium organized by Boyce Griffith, Sookkyung Lim and Sarah Olson*

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<td>Modelling and simulation of particles in contact II</td>
<td>Kristin M. de Payrebrune and Matthias Kröger</td>
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<td>MS105B</td>
<td>Modelling of surface forces between two highly rough surfaces using AFM topography scans</td>
<td>Lisa Ditscherlein and Urs A. Peuker</td>
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<td>MS146B</td>
<td>Experimental and numerical study of the contact between particles and microstructured surfaces covered with a liquid layer</td>
<td>David Strohner and Sergiy Antonyuk</td>
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<td>MS153B</td>
<td>Contact behavior of particle laden bubbles</td>
<td>Jan Nicklas, Lisa Ditscherlein and Urs A. Peuker</td>
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<td>MS154B</td>
<td>Influence of Cooling Lubricants on the Interaction Between Indenter and Material Surface During Scratch Tests</td>
<td>Felix Köstner and Kristin M. de Payrebrune</td>
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<td>MS155B</td>
<td>Contact avoiding for rigid particles in a Stokesian fluid</td>
<td>Anna Broms and Anna-Karin Tornberg</td>
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<td>MS156B</td>
<td>Numerical and experimental understanding of wet three-body abrasive wear in pumps</td>
<td>Jens S. K. Jensen and Ramin Aghababaee</td>
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**Strain stiffening of Salmonella flagella measured by flow-induced deformations**

Hossein Moghmifam, Jamel Ali, Min Jun Kim and Henry C. Fu

**Models and simulations of micro-swimmer motion in complex confinement**

Enkeleida Lushi

**Simulated motility of a bilophotrichous bacterium**

Henry Shum and Vahid Nourian

**Experimental investigation of flow through deformable bodies under physiological condition**

Mateusz Mesek, Aleksander Sinek, Marek Rojczyk, Jan Juszczyk, Wojciech Adamczyk, Ziemowit Ostrowski and Ryszard Białecki

**On the influence of natural curvature on the reconfiguration of thin submerged biological structures**

Alessandro Nitti and Marco D. de Tullio

**Dynamics of membrane growth and form**

Thomas Fai

#### 6/6/22 14:00 - 16:00

#### Multiscale modeling of concrete and concrete structures - in honor of the 80th birthday of Prof. Herbert A. Mang II

*Minisymposium organized by Bernhard Pichler, Yong Yuan and Günther Meschke*

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**Multiscale mechanics of dental cement paste**

Petr Dohnalík, Bernhard Pichler, Luis Zelaya-Lainez, Olaf Lahayne, Gilles Richard and Christian Hellmich

**Simulating Concrete Failure Using the Microplane (M7) Constitutive Model and Correspondence-Based Peridynamics: Validation and Extension to Fracture and Fragmentation**

Yuri Bazilevs

**A LCP formulation for the fracture analysis of concrete using zero-thickness interface elements**

Caterina Biscaro, Giovanna Xotta and Ignacio Carol

**Multiscale analysis of elastic stiffness properties sodium hydroxide-activated slag pastes coupling thermodynamic modeling and micromechanical modeling**

Luise Göbel, Markus Königsberger, Ali Naqi and Stéphanie Staaquet

**Multiphysics modeling of concrete: improved description of the hygro-mechanical coupling of shrinkage and creep**

Andreas Brugger, Peter Gamnitzer and Günter Hofstetter

**Synthesis of multiscale simulations and 3d-scanning for the characterization of freeze-thaw damage in concrete**

Jithender J. Timothy, Alexander Haynack, Thomas Kränkel and Christoph Gahlen
## CONFERENCE PROGRAMME & TECHNICAL SESSIONS

**MONDAY**

### 6/6/22 14:00 - 16:00
**UQ and data-driven methods for scale-resolving turbulent flow simulations II**
Minisymposium organized by Saleh Rezaeiravesh, Philipp Schlatter and Maria Vittoria Salvetti

- **MS155B**
  - **Room:** Buskerud (1F)
  - **Chair:** Saleh Rezaeiravesh
  - **CoChair:** Philipp Schlatter

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<td>Andrew Mole, Alex Skillen and Alistair Revell</td>
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<td>Energy consistent machine learning closure model for fluid flow problems</td>
<td>Toby van Gestelten and Benjamin Sanderson</td>
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<td>Data-driven LES for the flow around a 5:1 rectangular cylinder</td>
<td>Gabriel I. Moldovan, Alessandro Mariotti, Guillaume Lehmusch, Laurent Cordier, Maria V. Salvetti and Marcello Meldi</td>
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<td>Adaptive Gaussian process surrogate modelling of large-eddy simulation for microscale atmospheric dispersion</td>
<td>Bastien X. Nony, Mélanie C. Rochoux, Didier Lucor and Thomas Jaravel</td>
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<td>Learning reduced subgrid-scale models</td>
<td>Wouter Edeling and Daan Crommelin</td>
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<td>Explorative In-situ Analysis of Turbulent Flow Data Based on a Data-Driven Approach</td>
<td>Christian Gscheidle and Jochen Garcke</td>
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### 6/6/22 14:00 - 16:00
**Computations in Environmental and Geophysical Fluid Mechanics II**
Minisymposium organized by Clint Dawson, Ethan Kubatko and Eirik Valseth

- **MS55B**
  - **Room:** Hordaland 1 (1F)
  - **Chair:** Clint Dawson
  - **CoChair:** Eirik Valseth

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<td>Vadym Aizinger, Sara Faghih-Naini and Daniel Zint</td>
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<td>On shallow water, diffusive, and kinematic flow approximations for modeling rainfall runoff</td>
<td>Ethan Kubatko and Young hun Kang</td>
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<td>Microscale simulations of extreme events in wind farms over complex terrain driven by mesoscalar flows</td>
<td>Matias Aulio, Oriol Lehmkuhl, Herbert Owen and Daniel Paredes</td>
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<td>Christian Helanow and Josefin Ahlkrona</td>
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<td>Comparison of structure-preserving numerical methods for the KdV equation</td>
<td>Arnaud D. Franken, Paolo Cifani, Erwin Luesink, Sogy R. Ephriati and Bernard J. Geurts</td>
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<td>A compositional Eulerian approach for modelling oil spills in the sea</td>
<td>Benjamin Ivorra, Susana Gomez, Jesús Carrera and Ángel M. Ramos</td>
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### 6/6/22 14:00 - 16:00
**Higher order finite element methods for challenging mathematical problems in engineering and applied sciences II**
Minisymposium organized by Antti H. Niemi and Leszek F. Demkowicz

- **MS92B**
  - **Room:** Hordaland 2 (1F)
  - **Chair:** Antti Niemi
  - **CoChair:** Leszek Demkowicz

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<td>Discontinuous Galerkin method for the computation of axisymmetric flows.</td>
<td>Anthony Bosco, Vincent Perrier and Jonathan Jung</td>
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<td>Francesco Bassi, Alessandro Colombo, Andrea Crivellini and Francesco Carlo Massa</td>
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<td>A matrix-free solver for high-order discretization in cardiac electrophysiology</td>
<td>Pasquale C. Africa, Matteo Salvador and Paola Gervasio</td>
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### 6/6/22 14:00 - 16:00
**Advanced Methods in Computational Mechanics II**
Minisymposium organized by Josef Kiendl

- **CS01B**
  - **Room:** Oppland (1F)
  - **Chair:** Josef Kiendl

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<td>Robin Delbart, Colin Robert, T Quynh Truong Hoang and Francisca Martinez-Hergueta</td>
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<td>Modelling of anisotropic damage of 3D printed polymers under severe compression</td>
<td>Sofiane Guessasma and Sofiane Belhabib</td>
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<td>Hyperelasto-plastic model for analysing the frictions at the mesoscopic scale of laid-strand synthetic ropes</td>
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<td>Leila Farahzadi and Mahdi Koomarsi</td>
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CONFERENCE PROGRAMME & TECHNICAL SESSIONS

6/6/22 14:00 - 16:00
High-order grids: generation, adaption and applications in fluids and coupled problems
Minisymposium organized by Régis Duvigneau and Matthias Möller

- Isogeometric Discontinuous Galerkin method for compressible flows: opportunities and issues
  Régis Duvigneau and Stefano Pezzano
- Feature-independent mesh generation for high-order NEFEM
  Xi You, Ruben Sevilla, Oubay Hassan and Kenneth Morgan
- P2 cavity operator with simplex-based Jacobian correction and metric-based volume edge curvature
  Lucien Rochery and Adrien Loselle
- Spline-Based Parameterisation Techniques and Applications To Complex Engineering Designs
  Jochen Hinz and Annalisa Buffa
- Fully integrated mesh generation in fluid-structure interaction
  Thomas-Peter Fries, Domagoj Botnjak and Richard Schussnig

6/6/22 14:00 - 16:00
Mechanics of wood and biocomposites in engineering II
Minisymposium organized by Ani Khaloian, Markus Lukacevic and Jan-Willem van de Kuilen

- Phase Field Method-based Modeling of Fracture in Wood
  Sebastian Pech, Markus Lukacevic and Josef Füss
- Numerical simulation of moisture transport in wood and moisture induced cracking
  Florian Brandstätter, Maximilian Autengruber, Markus Lukacevic and Josef Füss
- Failure modeling of wood based on local material properties
  Franziska Seebert
- Constitutive model for the analysis of the behavior and mechanics of wood damage
  Roberto E. Quinteros-Mayne, Ignacio de Artegoy Jorda and José M. Cabrero
- A comparative study of materials models for solid and laminated birch wood over wide ranges of strain, strain-rate and temperature
  Georg Baumann, Ulrich Müller, Reinhard Brandner and Florian Feist
- Development of a 3D visco-elastic model for wood under large deformations
  Raúl Lazo-Molina, Carlos Felipe Guzmán, Juan Carlos Pina, Erick I. Saavedra Flores and Sergio J. Yanez

6/6/22 14:00 - 16:00
Model order reduction - Challenges in engineering and industrial applications II
Minisymposium organized by Annika Robens-Radermacher, Wil Schilders, Karen Veroy and Chady Ghnatios

- On the application of interpolation multipoint constraints within the floating frame of reference for the reduction of flexible multibody systems
  Alessandro Cammarata, Pietro Maddio and Rosario Sinatra
- Model order reduction for large-scale coupled problems with application to thermo-mechanical reliability analysis
  Pascal den Boer, Jos Moubach, Wil Schilders and Nathan van de Wouw
- Computationally efficient controller design for drilling automation using reduced order models
  Sajid Naderi Lordejani and Wil Schilders
- Abstracted structure-preserving reduction of interconnected structural models
  Luuk Poort, Rob Fey, Bart Besselink and Nathan van de Wouw
- Model reduction for variational inequalities
  Amrissa Nigh, Alexandre Ern, Virginie Ehrlacher and Guillaume Drouet
- Reduced-order modeling methods for the construction of virtual charts in nonlinear dynamics
  Alexandre Daby-Seesaram, Amélie Fau, Pierre-Étienne Charbonnel and David Néron

6/6/22 14:00 - 16:00
Modeling and simulation of highly flexible slender structures II
Minisymposium organized by Martin Arnold, Olivier Bruls, Elena Celliodoni, Brynulf Owren, Damien Durville, José Escalona, Johannes Gerstmayr, Gordon Jelenic, Sigrid Leyendecker, Joachim Linn, Tomaz Štukaj, Olivier Thomas and Dejan Zupan

- An isogeometric frictionless contact formulation for hyperelastic Cosserat rods with deformable cross-sections
  Myung-Jin Choi, Roger A. Sauer and Sven Klinkel
- Director-based IGA beam elements for sliding contact problems
  Paul Wasmer and Peter Betsch
- Objective mortar formulation for beam-to-beam contact
  Jan Tomček and Gordan Jelenic
- Axially moving beams in contact with sheaves
  Konstantina Ntarladima, Michael Pieber and Johannes Gerstmayr
- Mixed-dimensional coupling between 1D Cosserat continua and 3D solids - From embedded fibers towards contact
  Ivo Steinbrecher and Alexander Popp
- Coupling between 1D beam elements and 3D solid elements for the modelling of fiber-reinforced composites
  Valentin Poussard and Damien Durville
### Innovative Methods for Fluid-Structure Interaction II
**Minisymposium organized by** Harald van Brummelen, Trond Kvamsdal and Roger Ohayon

**Room:** A1 – 4  
**Chair:** Harald van Brummelen

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<td>Stefan Frei, Erik Burman, Miguel A. Fernandez and Fannie M. Gerosa</td>
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<td>Leaflet contact modelling and fluid-structure interaction within the left ventricle of the human heart</td>
<td>Joost Kronberg and Johan Hoffman</td>
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<td>A Spline-Based Framework for Microscopic Lubricated Contact Modelling in Orthogonal Cutting</td>
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<td>Projection-based reduced order model for the parametric analysis of hydroelastic vibrations of liquid-storage tanks</td>
<td>Christophe Hoareau, Jean-François Deü and Roger Ohayon</td>
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### Simulations of Polymers and Polymer Composites II
**Minisymposium organized by** Sebastian Pfaller, Fabrice Detrez and Hans van Dommelen

**Room:** A1 – 5  
**Chair:** Sebastian Pfaller

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<td>Dragana Kovačević and Frans P. van der Meer</td>
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<td>Asymptotic fiber orientation states of the quadratically closed Folgar-Tucker equation and a subsequent closure improvement</td>
<td>Tobias Karl, Davide Gatti, Bettina Frohnapfel and Thomas Böhlke</td>
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<td>Spatially distributed elastic-perfectly plastic material behavior of SFRC with experimental validation</td>
<td>Natalie Rauter</td>
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<td>Extended failure models for global and local analyses of composite aerostructures</td>
<td>Giuseppe Corrado, Alberto Arteiro, José Reinoso, Florian Gock and Fernand Ponthot</td>
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<td>Micromechanical Modelling of Rubber Toughened Glassy Polymers</td>
<td>Martin Wismans, Tom A. P. Engels, Lambert C. A. van Breen and Leon E. Godin</td>
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<td>Efficient calibration of a crystallization model for injection moulding simulation using surrogate modelling</td>
<td>Sandra Sand, Camilo Cruz, Gilles Regnier and Amine Anmar</td>
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### Advanced Computational Design and Manufacturing
**Simulation of Novel Materials and Structures II**
**Minisymposium organized by** Eric Li, Bing Li, Zh C He, QQ Li, Fei Wu, ZQ Zheng and Yi Wu

**Room:** A1 – 6  
**Chair:** N. BLAL

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<td>Numerical and experimental characterization of 3D printed lattice structures</td>
<td>Messima Carratara, Gianluca Alaimo, Alessandro Reali and Ferdinando Auricchio</td>
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<td>Validation of the temperature history during extrusion based additive manufacturing</td>
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<td>Pore-microstructure characterisation, reconstruction and simulation for CT-based fatigue-ranking of additively manufactured materials</td>
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6/6/22 14:00 - 16:00
Advanced Techniques for Coupled Problems II
Minisymposium organized by Markus Bause and Florin Adrian Radu

Chair: Markus Bause
CoChair: Florin A. Radu

Least-Squares and DPG approximation of eigenvalue associated to coupled problems
Fleurianne Bertrand

Hybridized discontinuous Galerkin/hybrid mixed discretizations for multiple network poroelasticity
Johannes Krause, Philip L. Lederer, Maria Lymbery, Kevin Oshues and Joachim Schöberl

A multirate-in-time framework for coupled transport and flow with goal-oriented space-time adaptivity
Marius P. Bruchhäuser, Uwe Köcher and Markus Bause

A Study of FEM/DEM Coupled Solution of Triaxial Test: An Experimental Validation
Amir Atrian, Lars Radtke, Maksym Dosta and Alexander Düster

Speeding up convergence for a coupled dynamic multi-field model for anisotropic porous materials
Nico De Marchi, Giovanni Zotto, Massimiliano Ferronato and Valentina Salomoni

6/6/22 14:00 - 16:00
Complex fluid flow in engineering: modeling, simulation and optimization II
Minisymposium organized by Fabian Key, Marek Behr and Stefanie Elgeti

Chair: Stefanie Elgeti

On the design of fractional step methods for flow problems—Application to viscoelastic flows and compressible flows
Ramon Codina, Joan Baiges, Samuel Parada and Laura Moreno

Adaptive Immersed Mesh Method for Fluid-Structure Interaction
Ramy Nemer, Aurelien Larcher and Elie Hachem

Non-reflecting boundary conditions on unstructured grids
Hans-Peter Kersken and Christian Frey

Dirichlet boundary control of a steady multiscale fluid-structure interaction system
Giacomo Barbi, Andrea Chierici, Valentina Giavacchini, Luigi Manes, Sandro Manservisi and Lucia Siroli

A boundary-conforming mesh-update method for flow problems with topology changes
Felipe Gonzalez-Cornejo, Stefanie Elgeti and Marek Behr

CFD validation of a controllable pitch marine propeller using a truly autonomous mesh generation with adaptive mesh refinement
Mathieu Vigné and Pietro Sciencia

6/6/22 14:00 - 16:00
Robust and scalable numerical methods for wave propagation: design, analysis and application II
Minisymposium organized by Hélène Barucq, Théophile Chaumont-Frelet, Raba Djellouli and Axel Modave

Chair: R. Djellouli

Nonlocal material parameters describing metamaterials at the effective level
Fatima Z. Goffi, Ramakrishna Venkitakrishnan, Carsten Rockstuhl and Michael Plum

Numerical treatment of the vectorial equations of solar oscillations
Tilmann Alemán, Martin Halla, Christoph Lehrenfeld and Paul Stocker

Adaptive DPG-based Multigrid Solver for Bent Optical Fiber Simulations
Jacob Badger and Leszek Demkowicz

A posteriori error estimates for finite element discretizations of time-harmonic Maxwell's equations coupled with a non-local hydrodynamic Drude model
Théophile Chaumont-Frelet, Stéphane Lanteri and Patrick Vega

Frequency-domain acoustic wave modeling via unstructured isogeometric analysis: performance and pollution study
Hélène Barucq, Henri Calandra, Julien Diaz and Stefano Frambati

Mixed precision sparse direct solver applied to 3D wave propagation
Partick Amestoy, Alfredo Buttari, Florian Fouquer, Matthieu Gerest, Jean-Yves L'Excellent and Theo Mary
### 6/6/22 14:00 - 16:00
**Deep Learning Approaches for Applied Sciences and Engineering II**  
Minisymposium organized by M. Giselle Fernández-Godino, Charles F. Jekel and Christian Gogu  
**MS117B**  
Room: Jan Mayen 3  
Chair: M. Giselle Fernandez-Godino  
CoChair: Charles F. Jekel

- **Machine Learning in Topology Optimisation - Challenges and Prospects** (Keynote Lecture)  
  Rebekka V. Woldseth, Niels Aage, J. Andreas Bærrentzen and Ole Sigmund

- Deep learning based dimensionality reduction for fracture mechanics  
  Ehsan Shinde, Vincent Iler, José Mennesson, Dmytro Vasylkov and Modesar Shaakoor

- Mesh generation for finite element simulations with Deep Learning  
  Martin Legeland, Kevin Linka and Christian J. Cyron

- Real-time large deformations: A probabilistic deep learning approach  
  Sourahb Deshpande, Jakub Lengiewicz and Stephane Bordas

- An explainable pipeline for machine learning with functional data  
  Katherine Goodle, J. Derek Tucker, Daniel Ries and Heike Hofmann

### 6/6/22 14:00 - 16:00
**Continuum Biomechanics of Active Systems II**  
Minisymposium organized by Tim Ricken, Oliver Röhrle and Silvia Buddayi  
**MS37B**  
Room: Lounge A2  
Chair: Silvia Budday  
CoChair: Lena Lambers

- Computational continuum modeling of cell aggregation phenomenon  
  Soheil Firooz, Hui-Shun Kuan, Vasily Zaburdaev, Paul Steinmann and Ali Javili

- Nonlocal bone remodelling with open system peridynamics  
  Emely Schaller, Ali Javili and Paul Steinmann

- FE models predict microdamage in normal and osteoporotic trabecular bone during compression  
  Athanassios Tsirigotis and Despoina Deligianni

- Experimental and numerical investigation of the behaviour of articular cartilage under tensile loading: A Theory of Porous Media (TPM) approach  
  Franziska E. Egli, Seyed Morteza Seyedpour and Tim Ricken

- LBM Bloodflow-Simulations in 3D Aneurysm-Geometries: From risk-assessment to the follow-up treatment  
  Gladys Gutierrez, Martinus Mahr, Natalia Nebulishvili and Barbara Wohlmuth

- Two-layers cell-wall modelling for S. cerevisiae yeasts  
  Zinab Ayad, Etienne Harlé, Françoise Argoul, Léo Delmarre, Pierre Argoul, Anne Devin and Boumediene Nedjar

### 6/6/22 14:00 - 16:00
**Discrete element method (DEM) simulations of pharmaceutical processes**  
Minisymposium organized by Peter Toson and Peter Böhling  
**MS143A**  
Room: Spitsbergen  
Chair: Peter Toson  
CoChair: Peter Böhling

- Development And Validation Of A Fast And Effective Iterative DEM Calibration Data-Base  
  Marko Matic, Peter Toson, Johan Remmelges, Dalibor Jajićević, Thomas O’Connor, Abdullah Koolivand, Geng Tian, Scott M. Krull and Johannes G. Khinast

- Impact of rotation axis positioning on industrial-scale powder mixers: a DEM study  
  Luca Greffe and Johannes G. Khinast

- Modeling of Pharmaceutical Tablet Compaction with Multi-Contact Discrete Element Method  
  Kostas Giannis, Carsten Schilde, Jan Henrik Finke and Arno Kwaade

- In-Depth analysis of a Tablet Press Feed Frame with DEM  
  Peter Böhling, Pankaj Doshi, Peter Toson, Martina Trogrlic, Marko Matic, Daniel Blackwood, Kai Lee, Marta Moreno-Beníto, Giuseppe Cogoni, Elisabeth Peeters, James Kimber, Hugh Verrier, Johannes Khinast and Dalibor Jajićević

### 6/6/22 14:00 - 16:00
**Multiscale Computational Homogenization for Bridging Scales in the Mechanics and Physics of Complex Materials II**  
Minisymposium organized by Julien Yvonnet, Kenjiro Terada, Peter Wriggers, Marc Geers, Karel Matous and Paul Steinmann  
**MS6B**  
Room: Svalbard  
Chair: Caglar Oskay

- Using a reduced set of Fourier modes in terms of a FFT-based microstructure simulation  
  Christian Gierde, Johanna Waimann, Bob Svendsen and Stefanie Reese

- Fast FE2 nonlinear multiscale simulations with loading path-dependent behaviors using k-means  
  Julien Yvonnet, Mohamed Amine Benaimene, Souhail Chaouch, Benoit Bary and Qi-Chang He

- Multiscale modelling of shell structures with artificial neural networks  
  Jeremy Geiger, Werner Wagner and Steffen Freitag

- Multiscale modeling of quasi-brittle materials based on artificial neural networks  
  Gian-Luca Greuchen, Patrick Kurzeja and Jörn Mosler

- Numerical model reduction with adaptive basis enrichment for computational homogenization of porous media  
  Fredrik Ehre, Ralf Jänicke, Carmen Gräßle, Heike Foßbender, Fredrik Larsson and Kenneth Runesson

- Accelerating geometrically parameterized nonlinear microstructures via a non-intrusive reduced basis method  
  Theran Guo, Ondřej Rokoš and Karen Veroy
### MONDAY

#### CONFERENCE PROGRAMME & TECHNICAL SESSIONS

**6/6/22 14:00 - 16:00**

**Image-informed computational models and methods for prediction of cancer growth and treatment response II**
- Chair: Guillermo Lorenzo
- CoChair: Michael R. A. Abdelmalik

**Dynamic contrast enhanced MRI for informing cancer treatment: challenges and outlook for use in cancer modeling**
- Ryan T. Woodall, Jennifer M. Munson and Russell C. Rockne

**A Finite Element method to incorporate the effects of diffusion to the Extended Tofts Model**
- Diego Sainz-DeMena, Wenfeng Ye, María Ángeles Pérez and José Manuel García-Aznar

**Combination therapies and drug resistance in heterogeneous tumoral populations**
- Marcello Delitala, Elena Piretto and Maria Ferrari

**A mathematical study of the influence of hypoxia on phenotypic heterogeneity in cancer and its impact on radiotherapy effectiveness**
- Giulia Chiari

**Recent Advances in the Modelling of Architectured Metamaterials II**
- Minisymposium organized by Daniela Addessi, Andrea Bacigalupo, Maria Laura De Bellis and Francesca Fantoni
- Chair: De Bellis Maria Laura
- CoChair: Addessi Daniela

**Localized modes in imperfect periodic structures**
- Yilun Li, Régis COTTEREAU and Bing TIE

**Micropolar identification of periodic cauchy materials through asymptotic homogenization**
- Maria Laura De Bellis, Andrea Bacigalupo and Giorgio Zavarise

**Design optimization of a single-phase elastic metamaterial for enhancing impact resistance**
- Ana C. A. Vasconcelos, Dirgena Schott, Jovana Jovanova and Alejandro M. Argón

**Beam lattice metamaterials with internal contact and instabilities**
- Martin Horek, Emma La Malfa Ribolla and Milan Jirásek

**Coffee Break**

**16:00-16:30**

**6/6/22 16:30 - 18:30**

**Isogeometric Methods III**
- Minisymposium organized by Alessandro Reali, Yuri Bazilevs, David J. Benson, René de Borst, Thomas J.R. Hughes, Trond Kvamsdal, Giancarlo Sangalli and Clemens V. Verhoosel
- Chair: Giancarlo Sangalli

**Some recent advances and applications in isogeometric analysis (Keynote Lecture)**
- Alessandro Reali

**Floating isogeometric analysis**
- Helge C. Hille, Siddhant Kumar and Laura De Lorenzi

**An optimally convergent smooth blended B-spline construction for unstructured quadrilateral and hexahedral meshes**
- Kim Je Koh, Deepesh Toshniwal and Fehmi Cirak

**Adaptive mixed isogeometric analysis of a highly convective benchmark problem for the Boussinesq equations**
- Abdullah Abdulhameed, Trond Kvamsdal, Mukesh Kumar and Arne Morten Kvarving

**G1-conforming Bezier FE formulation for the analysis of Kirchhoff rod assemblies**
- Leopoldo Greco, Massimo Cuomo and Angelo Scrofani

**Coffee Break**

**16:30-18:30 | TECHNICAL SESSIONS**

**6/6/22 16:30 - 18:30**

**Shock Wave Boundary Layer Interaction in Aeronautical Applications II**
- STS05B
- Room: Hedmark (GF)
- Chair: Pawel Flaszynski

**Transonic Buffet Simulation using a Partially-Averaged Navier-Stokes Approach**
- Andrea Petrochii, Rene Steijl and George Barakos

**Numerical Investigations of Transitional SBLI on a Highly Loaded Transonic Compressor Passage in Industrial Applications**
- Selin Kahrman, Paolo Adami and Marius Swoboda

**Test Section Design for Investigations of SBLIs in Highly Loaded Compressor Stator**
- Arun Joseph, Pawel Flaszynski, Piotr Doerffer and Michal Piotrowicz

**Towards mitigation of altitude-excitations in transonic compressors**
- Philipp Nel, Patrick Grothe and Paolo Adami
CONFERENCES PROGRAMME & TECHNICAL SESSIONS

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<td>Minisymposium organized by Nicolas Barral, Hugues Digonnet, Algiane Froehly and Jeroen Wackers</td>
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<td>A novel approach for anisotropic mesh adaptation on massively parallel distributed-memory systems</td>
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<td>Parallel mesh adaptation on complex microstructures</td>
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<td>Hugues Digonnet, Nesrine Aissa and Luisa Silva</td>
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<td>A practical algorithm to build geometric models of cardiac muscle tissue</td>
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<td>Mark Potse, Luca Cirrrotto and Algiane Froehly</td>
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<td>Anisotropic adaptive finite elements for aluminium electrolysis</td>
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<td>Samuel Dubuis, Marco Picasso and Paride Passelli</td>
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<td>Towards coupled simulations on unstructured meshes for CO2 geological storage</td>
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<td>Margaux Raguenel, Jeanne Pellerin, Pierre Samier and Gilles Darche</td>
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<td>Mesh adaptation of ablating hypersonic vehicles</td>
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<td>Jérôme Breil, Claire Roche and Marina Olazabal</td>
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<td>Design of cellular materials for multiscale topology optimization</td>
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<td>Simona Perotto, Nicola Ferro, Daniele Bianchi, Rauffele Ferrante and Marco Mannisi</td>
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<td>6/6/22 16:30 - 18:30</td>
<td>Optimal Control and parameter estimation for plasmas</td>
<td>Minisymposium organized by Didier Auroux, Louis Lamerand, Francesca Rapetti and Eric Serre</td>
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<td>Identification of the plasma current density in a Tokamak</td>
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<td>Fast high-order integral equation solver for stepped pressure magnetohydrodynamic equilibria</td>
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<td>Dharlya Malhotra, Antoine Cerfon, Lise-Marie Imbert-Gérard and Michael O’Neil</td>
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<td>GVECE: A new MHD equilibrium code for three-dimensional magnetic confined plasma states</td>
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<td>Direct gradient-based design of non-axisymmetric coil systems with excellent charged particle confinement properties</td>
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<td>Andrew Giuliani, Florian Wechsung, Georg Stadler, Antoine Cerfon and Matt Landreman</td>
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<td>Parameter identification for turbulent transport of fusion plasmas</td>
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<td>Louis Lamerand, Didier Auroux and Francesca Rapetti</td>
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<td>Neural network based closures to fluid systems trained with kinetic simulations</td>
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<td>6/6/22 16:30 - 18:30</td>
<td>Metamaterials Across the Scales: Modeling, Experiment and Simulation III</td>
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<td>Efficient dispersion curve computations for periodic vibro-acoustic structures using the (generalized) Blough mode synthesis</td>
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<td>Vanessa Cool, Frank Noets, Lucas Van Belle, Wim Desmet and Elke Deckers</td>
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<td>Influences of the geometrical nonlinearity on the complex band structures of periodic lattice frame structures</td>
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<td>Marius Meilmann and Chuanzeng Zhang</td>
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<td>Controlling stiffness of a mechanical metamaterial by pneumatic actuation</td>
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<td>Three-dimensional solids and structures within strain gradient elasticity: numerical methods and model comparisons</td>
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<td>Jarkko Niiranen, Seyed Hosseini, Jalal Torabi and Tuan Nguyen</td>
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<td>Energy-momentum conserving dynamic variational modeling of fiber-bending stiffness in composites</td>
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<td>Iniyan Kalaimani, Julian Dietzsch and Michael Groß</td>
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## Unstructured mesh adaptation: from mesh generation to applications I

**Minisymposium organized by Malte von Scheven, Renate Sachse, Ann C. Sychterz and Victor Charpentier**

**Chair:** Ann C. Sychterz  
**CoChair:** Malte von Scheven

**MS62A**  
**Room:** Rogaland (GF)  
**6/6/22  16:30 - 18:30**

- Bioinspired compliant folding mechanisms  
  *Axel Körner* and Jan Knippers

- Redundancy distribution in elastostatic beam and thin-walled structures  
  *Jan Gade*, Anton Tkachuk, Malte von Scheven and Manfred Bischoff

- Cable-actuation of pill bug-inspired adaptive origami structure using computer vision  
  *Ann C. Sychterz*

- Design of integrated fluidic actuators for multi-axial loaded structural elements  
  *Matthias J. Bosch*, Markus Nitzlader, Timon Burghardt, Matthias Bachmann, Hansgeorg Binz, Lucio Blandini and Matthias Kreimeyer

- Topological derivative-based topology optimization of incompressible structures using mixed formulations  
  *Inocencio Castañar*, Joan Baiges, Ramon Codina and Henning Venghaus

- Vibration sensors placement optimization  
  *Marko Jokić* and Jurica Rožič

- The Redundancy Matrix as an Alternative Measure for the Assessment of Adaptive Structures  
  *Malte von Scheven*, Florian Geiger, Jan Gade, Ekkehard Ramm and Manfred Bischoff

## Modelling and simulation of particles in contact III

**Minisymposium organized by Kristin M. de Payrebrune and Matthias Kröger**

**Chair:** Matthias Kröger  
**CoChair:** Kristin de Payrebrune

**MS105C**  
**Room:** Romerike (GF)  
**6/6/22  16:30 - 18:30**

- An effective level set discrete element model (LS-DEM) for sintering  
  *Brayan M. Paredes Goyes*, David Jauffres and Christophe Martin

- Fast and simple creation of powder beds for selective laser melting  
  *Lucas Lubecke* and Kristin M. de Payrebrune

- Sintering of Alumina Nanoparticles: A Comparison of Interatomic Potentials by Atomistic Simulations  
  *Shyamal Roy*, Arun Prakash and Stefan Sandfeld

- Contact force models between nanoparticles in agglomerates, aggregates, and films and their parameterisation.  
  *Stefan Endres* and *Lutz Mößler*

- On the formation of rolling particles during sliding contact  
  *Ramin Aghababaei*

- Simulation of non-round particles in tribological three-body systems  
  *Raphael Bli* and Kristin M. de Payrebrune

- Microstructural modelling of materials processed with wire arc additive manufacturing  
  *Johannes von Dommelen*, Tim van Nuland, Luca Palmeira Belotti, Johan Hoefnagels and Marc Geers

## Biological fluid mechanics: modeling, simulation, and analysis III

**Minisymposium organized by Boyce Griffith, Sookkyung Lim and Sarah Olson**

**Chair:** Enkeleida Lushi

**MS99C**  
**Room:** Sør – Norge (GF)  
**6/6/22  16:30 - 18:30**

- The many behaviors of active droplets  
  *Yuan-Nan Young*, Michael Shelley and David Stein

- How fluid rheology shapes microorganism swimming gait in viscoelastic fluids  
  *Robert Guy*, Kathryn Link and Becca Thomases

- Hydrodynamic Interactions of Micro-Swimmers  
  *Sarah Olson* and Lucia Corichino

- Ion-binding-mediated swelling of a mucus-like polyelectrolyte gel model  
  *Owen Lewis*, Jian Du, James Keener and Aaron Fogelson

- Flow coupled with advection, reaction and diffusion in evolving porous media: homogenisation and simulation  
  *David Wiedemann* and Malte A. Peter

- Microhydrodynamics of linear poroelastic materials  
  *Moslem Moradi*, Wenzheng Shi and *Ehsan Nazockdast*
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<th>Time</th>
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| 6/6/22 16:30 - 18:30 | **Multiscale modeling of concrete and concrete structures - in honor of the 80th birthday of Prof. Herbert A. Mang III**  
|                | Minisymposium organized by Bernhard Pichler, Yong Yuan and Günther Meschke  
|                | Chair: Yong Yuan  
|                | **Flexible weights for high order Whitney forms** (Keynote Lecture) Ana Alonso Rodriguez, Ludovico Bruni Bruno and Francesco Rapetti  
|                | **Structure-preserving discretizations and preconditioning for incompressible MHD models** Fabian Laakmann, Patrick E. Farrell, Kaibo Hu and Lawrence Mitchell  
|                | **Computational fluid dynamics with discrete exterior calculus** Pankaj Jagad, Abdullah Abukhwejah2, Bhargov Mantravadi, Minmiaow Wang and Ravi Santan  
|                | **On Geometric PIC-like discretizations of Lie-Poisson brackets** William Barham, Philip Morrison and Eric Sonnendruecker  
|                | **Continuum semiconductor physics model compression via Data-driven Discrete Exterior Calculus** Andy Huang, Nathaniel Trask, Jonas Actor, Xiaozhe Hu, Ravi Patel, Xujiao Gao and Christopher Brissette  
|                | **A framework for implementing general higher order virtual element spaces** Andreas Dedner and Alice Hudson  
|                | **Computational multiphysics modelling to predict the performance of melting probes in ice** Leonardo Boldi, Stefanie Elgeti and Julia Kowalski  
|                | **Simulation of hydraulic failure in the framework of the Theory of Porous Media** Julia Nicola Sunten, Alexander Schwarz, Joachim Bluhm and Jörg Schröder  
|                | **Physics-Informed Machine Learning for Underground Reservoir Pressure Management with Heterogeneity** Aleksandra Pachaitova, Dan O'Malley, Dylan Harp and Hari Viswanathan  
|                | **A Stable Mixed Finite Element Method for the Elastic Deformation of Coastal Structures** Eirik Valseth, Clint Dawson, Albert Romkes and Austin Kaul  

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| 6/6/22 16:30 - 18:30 | **Advances in structure-preserving methods and applications I** Minisymposium organized by Joubine Aghili and Francesco Bonaldi  
|                | **Kinetic Monte Carlo simulations of carbonation and self-healing in concrete** Enrico Masoero, Alex Aleena and Irina D. Ofiteru  
|                | **Flexible weights for high order Whitney forms** (Keynote Lecture) Ana Alonso Rodriguez, Ludovico Bruni Bruno and Francesco Rapetti  
|                | **Structure-preserving discretizations and preconditioning for incompressible MHD models** Fabian Laakmann, Patrick E. Farrell, Kaibo Hu and Lawrence Mitchell  
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**CONFERENCE PROGRAMME & TECHNICAL SESSIONS**
### MONDAY

#### CONFERENCE PROGRAMME & TECHNICAL SESSIONS

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<td>A discontinuous Petrov-Galerkin method for elasticity problems with non-linear decomposition of the elastic energy density function&lt;br&gt;Jacob Salazar solano and Leszek Demkowicz</td>
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<td>Effective Material Parameters for Perforated Shells&lt;br&gt;Stefano Giani and Harri Hakula</td>
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<td>A framework for identifying better cubature rules for plane and solid elements&lt;br&gt;Weizhu Wang and Stefanos-Aldo Papanicopulos</td>
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<td>New Three-Node Assumed Strain Mindlin Plate Finite Elements&lt;br&gt;Martin Grbac and Dragan Ribarić</td>
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<td>Asymptotic and numerical analysis of the buckling problem for a cylindrical shell&lt;br&gt;Antti H. Niemi, Harri Hakula and Keijo Ruotsalainen</td>
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<td>Stability of 2-domain wall for the Landau-Lifshitz-Gilbert equation in a nanowire with Dzyaloshinskii-Moriya interaction&lt;br&gt;Raphaël Côte and Guillaume Ferriere</td>
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<td>Domain Walls pinning in notched ferromagnetic nanowires&lt;br&gt;Gilles Carbou and David Sanchez</td>
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<td>Numerical methods for inertial spin dynamics in ferromagnets and antiferromagnets&lt;br&gt;Michele Ruggeri</td>
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<td>Stochastic modelling of thermal effects on a ferromagnetic nano particle&lt;br&gt;Jérôme Lelong and Stéphane Labbé</td>
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<td>Higher dimensional topological textures in multiferroics&lt;br&gt;Patrick Buhl, Louise Desplat, Sebastian Meyer and Bertrand Dupé</td>
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<td>Computational micro-magneo-mechanics&lt;br&gt;Christian Dorn and Stephan Wulfinghoff</td>
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<td>Mathematical and numerical modeling of cardiac electromechanics in scar-related ventricular tachycardia&lt;br&gt;Matteo Salvador, Marco Fedele, Francesco Regazzoni, Stefano Pagni, Pasquale Claudio Africa, Luca Dedé, Natalia Trayanova and Alfio Quarteroni</td>
<td>Matteo Salvador, Marco Fedele, Francesco Regazzoni, Stefano Pagni, Pasquale Claudio Africa, Luca Dedé, Natalia Trayanova and Alfio Quarteroni</td>
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<td>Modeling the electromechanics of the whole heart in detailed image-based geometries&lt;br&gt;Marco Fedele, Francesco Regazzoni, Roberto Piersanti, Matteo Salvador, Pasquale Claudio Africa, Luca Dedé and Alfio Quarteroni</td>
<td>Marco Fedele, Francesco Regazzoni, Roberto Piersanti, Matteo Salvador, Pasquale Claudio Africa, Luca Dedé and Alfio Quarteroni</td>
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<td>Non-linear model for the evolution of glioblastoma cells in microfluidic devices&lt;br&gt;Albert Costa-Solé, Marco Discacciati, Marina Pérez-Aliacar, Jacobo Ayensa-Jiménez, Manuel Doblaré and Jösen Sarrate</td>
<td>Albert Costa-Solé, Marco Discacciati, Marina Pérez-Aliacar, Jacobo Ayensa-Jiménez, Manuel Doblaré and Jösen Sarrate</td>
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<td>NUMERICAL ANALYSIS OF ASYMMETRIC SEPTAL HYPERTROPHIC CARDIOMIOPATHY&lt;br&gt;Igor Saveljic, Dalibor Nikolić, Smiljana Tomasevic and Nenad Filipović</td>
<td>Igor Saveljic, Dalibor Nikolić, Smiljana Tomasevic and Nenad Filipović</td>
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<td>6/6/22 16:30</td>
<td>Mechanics of wood and biocomposites in engineering III</td>
<td>MS21C</td>
<td>Markus Königsberger</td>
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<td>van de Kuijlen</td>
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<td>Complex finite element simulations of linear Hardwood cutting</td>
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<td>František Šebek, Petr Kubík, Jan Tippner, Martin Brabec and Ondřej Dvořáček</td>
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<td>Numerical analysis of rotational machining of hardwood</td>
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<td>Petr Kubík</td>
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<td>Numerical Analysis of Cross-Laminated Timber Connections using a Beam-on-</td>
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<td>Foundation Model</td>
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<td>Joan W. Gikonyo, Michael Schweigler and Thomas K. Rader</td>
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<td>Analysis of residual stress in curved glulam beams considering material</td>
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<td>Taoyi Yu, Ani Khaloian and Jan-Willem van de Kuijlen</td>
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<td>Modeling approach to estimate the bending strength and height effect of</td>
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<td>glued laminated timber beams</td>
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<td>Christoffer Vida, Markus Lukacevic and Josef Füssl</td>
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<td>Integrated approach for modeling post-tension loss in mass-timber panel</td>
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<td>Ryan P. Longman Longman, Esther J. Baas, John A. Nair, Lech Muszyński,</td>
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<td>An anisotropic elastic constitutive model for wood with hygroscopic swelling</td>
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<td>Model order reduction - Challenges in engineering and industrial applications</td>
<td>MS72C</td>
<td>Annika Robens-Rader-</td>
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<td>Model Reduction for Explicit Finite Elements in Crash Applications</td>
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<td>Matthias Lesjak and Fabian Duddeck</td>
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<td>Using Digital Twins for Predictive Maintenance</td>
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<td>Julian Henning and Karsten Urban</td>
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<td>On the invariant subspaces of deep learning-based reduced order models in</td>
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<td>Giorgio Gobat, Stefania Fresco, Andrea Operni, Andrea Manzoni and Arturo Franzi</td>
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<td>Data-driven models for shrinkage porosity prediction in aluminium casting</td>
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<td>Madyen Nouri, Julien Artouzou, Aude Caillaud, Amine Ammar, Francisco Chinetza</td>
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<td>and Ole Kiseř</td>
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<td>Surrogate Models for CFD Simulations Based on Convolutional Neural Networks</td>
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<td>Matthias Eichinger, Viktor Grimm, Alexander Heinlein and Axel Klawonn</td>
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<td>6/6/22 16:30</td>
<td>Modeling and simulation of highly flexible slender structures III</td>
<td>MS161C</td>
<td>Damien Durville</td>
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<td>Brynulf Owren, Damien Durville, José Escolano, Johannes Gerstmeyr, Gordon</td>
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<td>Jelenic, Sigrid Leyendecker, Joachim Linn, Tomasz Śulti, Olivier Thomas and</td>
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<td>Dejan Zupan</td>
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<td>A geometric nonsmooth modelling approach for braiding processes</td>
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<td>(Introjet Post) Alejandro Cosimo, Facundo Cosimo and Olivier Bruls</td>
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<td>Simulation of Frictional Contact Interactions Between Heddles and Yarns</td>
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<td>Withing Jacquard Harness of Weaving Looms for 3D Interlock Fabrics</td>
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<td>Salah Eddine Mermouli, Pietro Del Sorbo, Damien Durville, Bastien Tranquart</td>
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<td>and Dominique Coupé</td>
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<td>Velocity-based beam model for non-linear analysis of frame-likestructures with</td>
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<td>efficient consideration of strain localization</td>
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<td>Sudhanya Kusumap Chandrashekhara and Dejan Zupan</td>
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<td>Asymptotically based simulation of the Stokes flow in a layer through</td>
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<td>periodic flexural plates made of beams</td>
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<td>Maxime Krier and Julio Orlik</td>
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<td>An Elastica Robot: Tip control in tendon-driven elastic arms</td>
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<td>Ramsharan Rangarajan and Poonakanta Handral</td>
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<td>Nondimensionalized approach for flexible body motion with time-varying length</td>
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<td>Riko Ogawara, Yoshiaki Terunuch and Stefan Kaczmarczy</td>
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<td>6/6/22 16:30</td>
<td>Innovative Methods for Fluid-Structure Interaction III</td>
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<td>Harald van Brummelen</td>
<td>Trond Kvensdal and Roger</td>
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<td>Immersed method with metric based anisotropic mesh adaptation for multiphase</td>
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<td>fluid solid interaction (Keynote Lecture)</td>
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<td>Coupez Thierri, Nemer Rami and Hacchem Elie</td>
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<td>Low order fictitious domain method for FSI with enhanced stability and</td>
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<td>interfacial mass conservation</td>
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<td>Daniele C. Corti, Guillaume Delay, Miguel A. Fernandez, Fabien Vergnet and</td>
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<td>Marina Vidrascu</td>
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<td>Numerical Resolution of Euler's equations in a domain containing permeable</td>
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<td>moving boundary using immersed boundary methods with ghost points.</td>
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<td>Constance Bouquet, Cyril Desjouy and Gwénaël Gabard</td>
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<td>Modeling and simulation of thin-walled piezoelectric energy harvesters</td>
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<td>immersed in flow using monolithic fluid-structure interaction</td>
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<td>Lan Shang, Christophe Hoareau and Andreas Zilian</td>
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<td>Variational space-time localization for adjoint-based adaptivity of Navier-</td>
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<td>Stokes equations</td>
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<td>Julian Roth, Jan Philipp Thürle and Thomas Wick</td>
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### Simulations of Polymers and Polymer Composites III

**Minisymposium organized by Sebastian Pfaller, Fabrice Detrez and Hans van Dommelen**

**Room:** A1 – 5  
**Chair:** Hans van Dommelen

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<tr>
<td>Constitutive Modelling and Experimental Validation Of Amorphous Polymeric Blends PC/ABS</td>
<td>Fernando P.B. Macedo, Abilio M.P. de Jesus and Francisco M.A. Pires</td>
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<td>Rate-dependent damage-plasticity model for filled adhesive thermosets</td>
<td>Pedro Henrique Rios Silveira, Jan Vorel and Roman Wan-Wedner</td>
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<td>Nonlinear Schapery viscoelastic material model for thermoplastic polymers</td>
<td>Lorendonna Kehrer, Thomas Zink, Valerian Hirschberg, Manfred Wilhelm and Thomas Böhlke</td>
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<td>Material modelling and mechanical behaviour of an SLA additively manufactured polymer</td>
<td>Ruben L. Sælen, Odd S. Hopperstad and Arild H. Clausen</td>
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<td>Growth modeling and mechanical study of anisotropy of polymer spherulite aggregates by FFT method</td>
<td>Xiaoxin Lu, Fabrice Detrez, Nicolas Auffray and Sebastian Roland</td>
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<td>Constitutive modelling of biopolymer aerogels</td>
<td>Ameya Rege</td>
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<tr>
<td>A thermo-coupled constitutive model for semi-crystalline polymers at finite strains: Application to varying degrees of crystallinity and temperatures</td>
<td>Marie-Christine Reuvers, Birte Boes, Sebastian Fiedler, Tim Brepols and Stefanie Reese</td>
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### Advanced Computational Design and Manufacturing Simulation of Novel Materials and Structures III

**Minisymposium organized by Eric Li, Bing Li, ZC He, QQ Li, Fei Wu, ZQ Zheng and Yi Wu**

**Room:** A1 – 6  
**Chair:** Eric Li

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<td>Eric Li and ZC He</td>
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<td>Modeling of the Thermal Field in Fused Deposition Modeling</td>
<td>Jan Vorisek</td>
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<td>De-homogenization of Stiffness Optimal Infill for Additive Manufacturing</td>
<td>Peter D. L. Jensen, Ole Sigmund, Niels Agee and Fengwen Wang</td>
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<td>Damping Optimization of Viscoelastic Cantilever Beams and Plates Under Free Vibration</td>
<td>Antoni Joubert, Grégoire Allaire, Samuel Amstutz and Julie Diani</td>
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<td>Determination of the forming limit diagram of the multilayer sandwich plates with numerical simulation of the Nakazima test</td>
<td>Konrad Perzynski, Lukasz Madej and Janusz Majta</td>
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### Structure preserving and adaptive polytopal methods

**Minisymposium organized by Paola F. Antonietti, Andrea Cangiani, Zhaonan Dong and Lorenzo Mascotto**

**Room:** B1 – 1  
**Chair:** Lorenzo Mascotto  
**CoChair:** Andrea Cangiani

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<td>Numerical modeling of multi-physics wave propagation with polytopal Discontinuous Galerkin methods</td>
<td>Paola F. Antonietti, Michele Betti and Ilaria Mazzieri</td>
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<tr>
<td>A multiscale hybrid-mixed method for Helmholtz problems in periodic structures</td>
<td>Théophile Chaumont-Freliex, Zakaria Kassali and Stéphane Lanteri</td>
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<td>Three quasi-Trefftz bases for the 3D convected Helmholtz equation</td>
<td>Lise-Marie Imbert-Gerard and Guillaume Sylvand</td>
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<td>Stabilization free Virtual Element Methods</td>
<td>Stefano Berrone, Andrea Borio and Francesco Marcon</td>
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<td>A velocity-based moving mesh virtual element method</td>
<td>Harry Wells</td>
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<td>Convergence analysis for some AVEMs</td>
<td>Claudio Canuto</td>
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<td>The Virtual Element Method for the 3D Resistive Magnetohydrodynamic Model</td>
<td>Lourenco Beirao da Veiga, Franco Dassi, Gianmarco Marzini and Lorenzo Mascotto</td>
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### High Performance Computing With Space-Time Methods

**Minisymposium organized by Norbert Hosters and Max van Danwitz**

**Room:** B1 – 2  
**Chair:** Max van Danwitz  
**CoChair:** Norbert Hosters

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<td>Coxeter triangulations, their quality, and an efficient data structure</td>
<td>Jean-Daniel Boissonnet, Siargey Kachanovich and Mathijs Wintraecken</td>
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<tr>
<td>A space-time discontinuous Galerkin method for seismic wave propagation problems</td>
<td>Ilaria Mazzieri and Paola F. Antonietti</td>
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<tr>
<td>Evaporation of a Suspended Droplet Using a Space-Time Least-Squares Spectral Element Method with C1 Hermite Elements for the Navier-Stokes-Korteweg Equations</td>
<td>Victor H. Cardoso Cunha, Maria Fernandino and Carlos A. Dorao</td>
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<td>Solution of nonlocal diffusion-type problems in unbounded domains using a space/time approach</td>
<td>Arman Shojaei, Alexander Hermann and Christian J. Cyron</td>
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<td>Space-time finite element methods for flow problems</td>
<td>Max van Danwitz, Norbert Hosters and Marek Behr</td>
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<td>Space-time methods for compressible flow on moving domains</td>
<td>Patrick Antony, Norbert Hosters and Marek Behr</td>
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<td>Simplex Space-Time Finite Elements for Fluid-Structure Interaction</td>
<td>Norbert Hosters, Patrick Antony, Max van Danwitz, Daniel Hilger, Michel Make, Thomas Spenko and Marek Behr</td>
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### MONDAY
CONFERENCE PROGRAMME & TECHNICAL SESSIONS

#### 6/6/22 16:30 - 18:30
**Complex fluid flow in engineering: modeling, simulation and optimization III**
Minisymposium organized by Fabian Key, Marek Behr and Stefanie Elgeti

**Chair:** Fabian Key

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**PINN-based Reconstruction of Particle/Density-driven Gravity Flows**
Romulo Silva, Aneya Jagtap, Rhenraj Shukla, Gabriel Barros, Alvaro Coutinho and George Karniadakis

**Reduced fluid structure interaction modeling of the aortic valve including leaflets curvature**
Ivan Fumagalli, Luca Dedè and Alfio Quarteroni

**A partitioned semi-implicit Reduced Basis Method for a Fluid-Structure Interaction problem**
Monica Nonino, Francesco Ballarin and Gianluigi Rozza

**Neural networks investigation of bifurcating phenomena in fluid-dynamics**
Federico Pichi, Francesco Ballarin, Gianluigi Rozza and Jan S. Hesthaven

**POD-Galerkin ROMs and physics-informed neural networks for solving inverse problems for the Navier-Stokes equations.**
Saddam Hijazi, Niels Landwehr and Melina Freitag

**Optimal control and bifurcating systems: an application to Navier-Stokes equations**
Maria Strazzullo, Federico Pichi, Francesco Ballarin and Gianluigi Rozza

**Optimization of the shape of Vertical Axis Wind Turbine rotor using POD based reduced order approach**
Zbigniew Buliński, Tomasz Krysński, Łukasz Marzec and Jakub Tumidajski

#### 6/6/22 16:30 - 18:30
**Recent advances in immersed boundary and fictitious domain methods III**
Minisymposium organized by Alexander Idesman, Guglielmo Scovazzi, Antonia Larose, Riccardo Rossi, André Massing, Santiago Badia and Francesc Verdugo

**Chair:** Alexander Idesman

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**The shifted boundary method for computational mechanics**
Guglielmo Scovazzi, Nabil Atallah, Kangon Li and Antonio Rodriguez-Ferran

**A Cut Finite Element Method for the Stokes Problem on Anisotropic Background Meshes**
Josefin Ahlkrona, André Massing and Daniel Elfverson

**Three-grid immersed finite elements for complex CAD models**
EtyFebrindojo, Jakub Sístek, Pavel Kus, Matija Kerman and Fehmi Cirak

**High order scheme for mixed formulation of problems with moving internal boundaries**
Tiffanie Carolin, Léo Nouveau, Héloïse Beaugendre, Mathieu Colin and Mario Ricchiuto

**Adaptive finite element approximations for the elliptic problems using regularized forcing data**
Luca Heltai and Wenyu Lei

**Learning cut-cell integration by means of deep neural networks**
Rene Hiemstra and Dominik Schillinger

#### 6/6/22 16:30 - 18:30
**Robust and scalable numerical methods for wave propagation: design, analysis and application III**
Minisymposium organized by Hélène Barucq, Théophile Chaumont-Frelet, Rabia Djellouli and Axel Modave

**Chair:** R. Djellouli

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**Incorporating effective transmission conditions between fluid and solid domains in transient wave propagation problems using the mortar element method**
Alexandre Imperiale

**Elastic wave propagation in multi-domain with a symmetric BEM/FEM coupling**
Sara Touhami and Denis Aubry

**Transient, global-in-time, convergent iterative coupling of acoustic BEM and elastic FEM**
Alice Nassor, Marc Bonnet and Stéphanie Challal

**Algorithmic aspects of time-domain Energetic BEM for Elastodynamics**
Alessandra Aimi, Luca Desiderio, Giulia Di Credico and Chiara Guardasoni

**High-order accelerated integral scattering solvers for frequency- and time-domain simulation, optimization and design**
Oscar P. Bruno

**Spacetime Trefftz-DG Formulation for Modelling Wave Propagation in Unbounded Domains**
Hélène Barucq, Henri Calandra, Julien Diaz and Vinduja Vasanthan

#### 6/6/22 16:30 - 18:30
**Deep Learning Approaches for Applied Sciences and Engineering III**
Minisymposium organized by M. Giselle Fernández-Godino, Charles F. Jekel and Christian Gogu

**Chair:** Charles F. Jekel

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**A PINN-based model for coupled hydro-poromechanics in reservoir simulations**
Caterina Millevoi, Nicolò Specia and Massimiliano Ferronato

**CoSTA: Improving physics-based models using deep learning**
Sindre S. Blakseth, Adil Rasheed, Trond Kvamsdal and Omer San

**Physics-informed neural networks applied to two-phase flow in porous media problems**
John Haring, Jose V. Aguado, Sebastien Comas-Cordona, Ramzi Askri and Domenico Borzacchiello

**Towards understanding of boiling conjugate heat transfer using physics informed neural network**
Robin Kamensky, Konstantinos Ritos, Victoria Doeleman, Jennifer Pestana, Katherine Tant and Salaheddin Rahimi

**Deep learning model operating on graph structured data for assisting multiphase flows**
George El Haber, Jonathan Viquerat, Aurelien Larcher, David Ryckelynck and Elie Hachem

**Physics inspired neural network plasticity modeling**
Knut Andreas Meyer and Fredrik Ekre
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<td>A multi-filament model of the ciliary axoneme with beating driven by dynamic instability</td>
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<td>A computational model of self-organized shape dynamics of active surfaces in fluids</td>
<td>Lucas D. Wittwer, Mirco Bonati, Elisabeth Fischer-Friedrich and Sebastian Aland</td>
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<td>Relocation of VEGFR2 and integrin during adhesion and spreading of endothelial cells</td>
<td>Matteo Serpelloni, Matteo Arricca, Claudia Bonanno, Cosetta Ravelli, Elisabetta Grillo, Stefania Mitola and Alberto Salvadori</td>
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<td>Active self-organization in actin-cytoskeleton</td>
<td>Waleed Ahmad Mirza, Marco Arroyo, Alejandro Torres Sanchez, Marco de Corato, Marco Pensalfini and Guillermo Vilanova</td>
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<td>Soft adhesion and decohesion dynamics of fluid membranes mediated by mobile binders</td>
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<td>How mechanobiology captures receptor clustering on lipid rafts during ligand binding</td>
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<td>Advances in automatic code-generation software for simulations in Science and Engineering</td>
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<td>Automatic Verification of Algorithmically Differentiated Code</td>
<td>Christina Paulin, Sébastien Bourasseau and Cédric Content</td>
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<td>Matrix-free, hybridised, compatible, high order finite element methods in Firedrake</td>
<td>Sophie Vorderwuelbecke, David Ham and Colin Cotter</td>
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<td>Cleaning up distributed objects in managed languages and applications in extremely large scale simulations</td>
<td>Jack Betteridge, Patrick Farrell and David Ham</td>
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<td>The Feel++ software: automation, code generation, applications</td>
<td>Christoph Prudhomme, Joubine Aghili, Luca Berti, Vincent Chabannes, Zohra Diouti, Romain Hild, Thibaut Meléot, Philippe Ricka, Thomas Soignet-Tardif, Abdoulaye Samake, Marcela Szopas and Christophe Trophime</td>
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<td>Koki Sagiyama, Vaclav Hapla, Matthew G. Knepley, Lawrence Mitchell and David A. Ham</td>
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<td>Nuclear thermal hydraulics modelling using automatic code generation</td>
<td>Kenechukwu Nwagwu, Claire Heaney, Alan Jones, Gerard Gorman, Christopher Pain and Paul Smith</td>
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<td>Second order density based nonlinear topology optimization using a high level weak form language</td>
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<td>Computational homogenization for predicting the macroscopic fatigue life of 3D-printed metallic microlattice materials</td>
<td>Farzin Mozafari and Ilker Temizer</td>
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<td>Fatigue damage modelling of intermetallic phases in polycrystals</td>
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<td>Two complementary high-cycle fatigue models for the multiscale simulation of fiber reinforced polymers</td>
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<td>3D Homogenization and Failure Analysis of Interpenetrating Metal-Ceramic Composites</td>
<td>Dominik Horn and Katrin Schulz</td>
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<td>Numerical solution of inverse problems for identification of a composite microstructure. Applications in design of functionally graded materials</td>
<td>Marek Wojciechowski, Marek Lefik and Daniela Boso</td>
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### CONFERENCE PROGRAMME & TECHNICAL SESSIONS

#### 6/6/22  16:30 - 18:30
**Multi-scale modelling of generalised continua and architectured materials**  
Minisymposium organized by Igor A. Rodrigues Lopes, Francisco M. Andrade Pires and Eduardo de Souza Neto  
**Room: O – 3**  
**Chair: Igor Rodrigues Lopes**

- On combined elasticity and plasticity theories in the framework of first and second strain gradient continuum mechanics  
  *Sergei Khakalo and Anssi Laukkanen*
- Finite element analysis of micromorphic elastic media  
  *Jalal Tarabi* and *Jarkko Niiranen*
- Improving the finite-element modelling of strain-gradient models  
  *Stefanos-Aldo Papanicolopoulos*
- Crack initiation from arbitrary 2D notches: efficient multi-scale models using the finite fracture mechanics concept  
  *Matthias Rettl, Martin Pletz* and *Clara Schuecker*
- Data driven multiscale modeling of architectured materials  
  *Eduard MARENIC* and *Jean-Charles Passieux*
- DeepBND: Using a hybrid ROM-NN approach to accelerate Computational Homogenisation in Solid Mechanics  
  *Felipe Rocha, Simone Deparis, Pablo Antolin* and *Annalisa Buffa*
- Macroscopic Length Scale Parameter in Second-Order Computational Homogenisation  
  *Igor A. Rodrigues Lopes* and *Francisco M. Andrade Pires*

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#### 6/6/22  16:30 - 18:30
**HPC methods for eigenvalue problems in applied science and engineering**  
Minisymposium organized by Ali Hashemian, David Pardo, Victor Calo, Carla Manni and Quanling Deng  
**Room: O – 4**  
**Chair: Ali Hashemian**

- On the Tracking of eigensolutions to parametric partial differential equations  
  *Moataz Alghamdi, Daniele Boffi* and *Francesca Bonizzoni*
- Eigenvalue approximation with the Discontinuous Petrov-Galerkin Method  
  *Fleurianne Bertrand, Daniele Boffi* and *Henrik Schneider*
- Approximation of eigenvalue problems with VEM  
  *Licia Gastaldi*
- Performance of Refined Isogeometric Analysis in Solving Generalized and Quadratic Eigenvalue Problems  
  *Ali Hashemian, Daniel Garcia, David Pardo* and *Victor Calo*
- Outlier-free isogeometric discretizations  
  *Carla Manni, Espen Sande* and *Hendrik Speleers*
- Global Stability Analysis Of Industrial Compressible Fluid Flows  
  *Valentin Far, Cédric Content, Sébastien Bourasseau, Samir Beneddine, Denis Sipp* and *Jean-Christophe Robinet*
- Kohn-Sham density functional theory calculations with isogeometric analysis  
  *Kaan Karaca* and *Ilker Temizer*

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**19:00 - 21:00**  
Welcome Reception at Nova Spektrum Hall B1
CONFERENCE PROGRAMME & TECHNICAL SESSIONS

Tuesday, June 7th

7/6/22  09:00 - 10:30  
**Plenary Lectures I**

*Room: B3 + B4*

Chair: Trond Kvamsdal

The Finite Element Method and Computational Mechanics: Past, Present and a Vision of the Future

Thomas J.R. Hughes

Computational mechanics and the green transition: motivation and examples

Pål G. Bergan

10:30 - 11:00

Coffee Break

11:00 - 13:00  |  TECHNICAL SESSIONS

6/6/22  11:00 - 13:00

Application of Hybrid Laminar Flow Control for Drag Reduction of Transport Aircraft

*Room: Hedmark (GF)*

Chair: Geza Schrauf

Airbus A320 flight tests of the AFlONext project with the vertical tail plane equipped by a hybrid laminar flow control system

Geza Schrauf and Heiko von Geyr

Laminar wing manufacturing developments and demonstrators for validation

Miguel Castillo, Federico Martín de la Escalera and David Cruz

Laminar Flow Control along the Attachment Line of a Swept Wing

Jeanne Methel, Fabien Mery, Olivier Vermeersch and Maxime Forte

Verification of transition prediction for flows with suction using linear stability theory and eN-method

Normann Krimmelbein and Andreas Krumbein

Impact of Boundary Layer Suction on the Prediction of Drag and Transition for Transport Aircraft with Hybrid Laminar Flow Control

Martin Kruse

**Tuesday**

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Thon Hotel Arena  NOVA Spektrum Center
### CONFERENCE PROGRAMME & TECHNICAL SESSIONS

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<td>A Neural network-enhanced reproducing kernel approximation for modeling strain localization</td>
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<td>An efficient collocation method for cardiac muscle simulations</td>
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**Unstructured mesh adaptation: from mesh generation to applications II**

Minisymposium organized by Nicolas Barral, Hugues Dignonnet, Algiane Froehly and Jeroen Wackers,

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<td>Chiara Narboni, David Danan, Felipe Bordeu, Julien Cortial, Chetra Mang , Christian Rey, Grégoire Allaire and Xavier Lorang</td>
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<td>Improving the performance of CFD solvers for quenching simulations using Hessian based a-posteriori error estimator</td>
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<td>Ghaninya Medjihou</td>
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<td>Axial Green function method for the incompressible Navier-Stokes flows</td>
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<td>Junhong Jo and Da Won Kim</td>
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### 7/6/22 11:00 - 13:00

**ECCOMAS Olympiad I**

ECOA Room: Oslo 1 (GF) Chair: Konrad Perzynski

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<td>Asymptotic analysis of high-contrast subwavelength resonator structures</td>
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<td>Erik O. Hilburn and Habiib Amnari</td>
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<td>Numerical Modelling of Electrostatic Spray Painting Process with a Rotating Bell Cup for Automotive Painting</td>
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<td>Mohammad-Reza Pendar and José Carlos Páscoa</td>
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<td>Monolithic matrix-free solver for fluid-structure interaction problems: time integration scheme and preconditioning</td>
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<td>Michal Wichtowski, Piotr Krzyżanowski, Stanisław Stupkiewicz and Luca Heltai</td>
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<td>Mathematical and computational modeling of flexoelectricity at mesoscopic and atomistic scales</td>
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<td>David Codony</td>
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<td>Numerical analysis of some nonlinear hyperbolic systems of Partial Differential Equations arising from Fluid Mechanics</td>
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<td>Ernesto Pimentel-Garcia</td>
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<td>Gaseous transport phenomena in rarefied conditions via deterministic and stochastic methods with applications in vacuum and fusion engineering</td>
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<td>Nikos Vasilopoulos and Dimitris Valougeorgis</td>
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### 7/6/22 11:00 - 13:00

**Multiphysics modelling by the lattice boltzmann method I**

Minisymposium organized by Alessandro De Rosis

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<td>Lattice-Boltzmann simulations of traffic-related atmospheric pollutant dispersion in urban areas</td>
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<td>Mathis Pasquier, Stéphane Jay and Pierre Sagaut</td>
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<td>Compressible lattice Boltzmann method for rotating overset grids</td>
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<td>Hensik YOO, Julien Favier and Pierre Sagaut</td>
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<td>Finite volume Lattice Boltzmann compressible approach for boundary conditions</td>
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<td>Thomas Coratger, Pierre Boivin and Pierre Sagaut</td>
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<td>Large Eddy Simulation of Forced Plumes Using Lattice Boltzmann Method</td>
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<td>Mostafa Taha, Song Zhao, Aymeric Lamorlette, Jean-Louis Consalvi and Pierre Boivin</td>
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<td>Pseudo-potential Lattice-Boltzmann Method applied to wetting on anisotropic surfaces</td>
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<td>Alexandre Epaule, Manuel Cobian and Stéphane Valette</td>
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# CONFERENCE PROGRAMME & TECHNICAL SESSIONS

## Polygonal and Polyhedral Discretizations For Partial Differential Equations I
**Minisymposium organized by Joe Bishop, Michele Botti, Gianmarco Manzini and N. Sukumar**

**Chair:** Joe Bishop  
**CoChair:** Gianmarco Manzini

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<tr>
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<tbody>
<tr>
<td>7/6/22 11:00 - 13:00</td>
<td>Rogaland (GF)</td>
<td>Polygonal and Polyhedral Discretizations For Partial Differential Equations I</td>
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</table>

Refinement of polygonal grids using Convolutional Neural Networks with applications to polygonal Discontinuous Galerkin and Virtual Element methods  
*Paola F. Antonietti and Enrico Manuzzi*

A space-time virtual element method for parabolic problems  
*Sergio Gómez, Lorenzo Mascotto, Andrea Moiola and Itaria Perugia*

Extended virtual element method for two-dimensional fracture modeling in linear elasticity  
*Andrea Chiocchi, Gianmarco Manzini, N. Sukumar and Elena Benvenuti*

Nonconforming virtual element methods for fourth-order problems  
*Alice Hodgson and Andreas Dedner*

Quality preserving polygonal mesh refinement algorithm for Virtual Element Methods  
*Mathieu Teissier and Alessandro D’Auria*

Weakly imposed Dirichlet boundary conditions for 2D and 3D Virtual Elements  
*Silvia Bertoluzza, Micol Pennacchio and Daniele Prado*

## Advanced materials: computational analysis of properties and performance I
**Minisymposium organized by Vadim V. Silberschmidt and Valery P. Malvesenko**

**Chair:** Vadim Silberschmidt

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<td>Romerike (GF)</td>
<td>Advanced materials: computational analysis of properties and performance I</td>
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Microstructurally-Based Statistical Predictions of Failure in Hydrided Zirconium Materials  
*(Keynote Lecture)*  
*Timir Hasan, Laurent Capolungo and Mohammed Zaky*

Effect of graphite-particle morphology on thermomechanical performance of compacted graphite iron: Numerical modelling  
*Minghua Cao, Evangelia Nektaria Palkanoglou, Konstantinos P. Baxevanakis Baxevanakis and Vadim V. Silberschmidt*

Dislocation-Density-Based Crystal Plasticity Modeling of Halite at Different Temperatures and Orientations  
*Timothy J. Truster, Wadi H. Imseeh, Ran Ma, Amirsalor Moslehy and Khalid A. Alshibli*

Data-led Mechanical and Thermal Analysis of Layered Structures Based on Parametric Finite Element Analysis and Neural Network  
*James Ben*

Voxel-based density registration of trabecular bone: a longitudinal HR-pQCT study of postmenopausal women  
*Juan Du, Mengen Huang, Simin Li and Vadim Silberschmidt*

## Biological fluid mechanics: modeling, simulation, and analysis IV
**Minisymposium organized by Boyce Griffith, Sookkyung Lim and Sarah Olson**

**Chair:** Owen Lewis

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<td>7/6/22 11:00 - 13:00</td>
<td>Sør – Norge (GF)</td>
<td>Biological fluid mechanics: modeling, simulation, and analysis IV</td>
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Secondary flow in helical square ducts with cochlea-like curvature and torsion  
*Noelle C. Hart, Dominik Obrist, Marco D. Caversaccio and Wilhelm Wimmer*

Development of a Fluid-Structure Interaction Model to Capture Displacements During Flow Through Deformable Bodies  
*Aleksander Sink, Mateusz Mesek, Marek Rojczyk, Wojciech Adamczyk, Jan Juszczak, Ziemowit Ostrowski and Ryszard Bialecki*

Neuromechanical wave resonance in fluid pumping  
*Alexander Hoover*

Impact of flow rate on wall vibration in intracranial aneurysms  
*David Bruneau, Kristian Valen Sendstad and David Steinman*

Characterization of left atrial flow patterns by proper orthogonal decomposition in universal atrial coordinates  
*Jorge Dueñas-Pamplona, Alejandro Gonzalo, Savannah Bifulco, Patrick Boyle, Elliot McVeigh, Andrew M. Kahn, Pablo Martinez-Legaz, Javier Bermejo, José Sierra-Pailleroles, Manuel García-Villalba, Óscar Flores, Javier Garcia-Garcia and Juan Carlos del Alamo*

## Advances in Numerical Methods for Fluid-Structure Interaction I
**Minisymposium organized by Bernhard Müller, Wolfgang Schröder, Arthur Rizzi, Joris Degroote and Stein Tore Johansen**

**Chair:** Bernhard Müller  
**CoChair:** Jesper Oppelstrup

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<td>7/6/22 11:00 - 13:00</td>
<td>Akershus (1F)</td>
<td>Advances in Numerical Methods for Fluid-Structure Interaction I</td>
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</table>

Unstructured cut-cell method for flow problems with moving surfaces *(Keynote Lecture)*  
*Wolfgang Schröder, Tim Wegmann and Matthias Meinke*

Computation of ship motion in waves, using cartesian cut-cells  
*Elena-Roxana Popescu, Song T. Dang and Stein Tore Johansen*

Accelerating quasi-Newton methods using various types of surrogate models  
*Nicolas Delaissé, Dieter Faconnier and Joris Degroote*

Modular programming approach to aircraft static aeroelasticity  
*Arthur Rizzi, Jesper Oppelstrup and Mengmeng Zhang*

High fidelity fluid-structure interaction simulation of a multi-megawatt airborne wind energy reference system in cross-wind flight  
*Niels Pynagt, Jolan Wauters, Guillaume Crevecoeur and Joris Degroote*
## CONFERENCE PROGRAMME & TECHNICAL SESSIONS

### 7/6/22 11:00 - 13:00
### Advances in structure-preserving methods and applications II
#### Minisymposium organized by Joubine Aghili and Francesco Bonaldi

**MS145B**  
Room: Buskerud (1F)  
Chair: Joubine Aghili  
CoChair: Francesco Bonaldi

- H 1 -conforming finite element cochain complexes on cartesian meshes  
  Francesco Bonizzoni and Guido Kanschat

- Hamiltonian models of the macroscopic Maxwell equations: continuous and discrete  
  William Barham, Philip J. Morrison and Eric Sonnendrücker

- Structure-preserving time integration of constrained thermomechanical systems based on the GENERIC formalism  
  Vanessa Valdes y Beck and Peter Betsch

- A new segregated-explicit staggered scheme for Lagrangian hydrodynamics  
  Nicolas Therme

- Conservative and consistent iterative methods  
  Viktor Linders and Philipp Birken

- Mixed finite element formulations and energy-momentum time integrators for thermo-viscoelastic gradient-based fiber-reinforced continua  
  Julian Dietzsch, Michael Groß and Iniyan Kalaimani

### 7/6/22 11:00 - 13:00
### Computational Structural Stability I
#### Minisymposium organized by Herbert A. Mang and Yeong-Bin Yang

**MS149A**  
Room: Hordaland 1 (1F)  
Chair: Yeong-Bin Yang

- Significance of exact geometry in stability analyses of shells  
  Bastian Oesterle, Florian Geiger, Manuel Fröhlich, David Forster, Ekkehard Ramm and Manfred Bischoff

- A hybrid-Trefftz finite element for the postbuckling analysis of composite shell structures  
  Francesco S. Liguori and Antonio Madeo

- Shell buckling with uncertainty quantification under limited data  
  Marc Pina, Werner Wagner and Freitag Steffen

- Buckling and postbuckling performance of composite fuselage panels with cutouts using continuous streamline fibres  
  Ahmad Alajiahmad and Christian Mittelstedt

- Impact of input uncertainty on film delamination driven by thermal induced instability  
  Nachman Makiel and Oded Robinovitch

- Nonlinear 3D analysis of laminated composite structures using variable kinematics elements  
  Sander van den Broek, Mayank Patni, Aewis Hii, Peter Greaves, Paul Weaver and Alberto Pirrera

### 7/6/22 11:00 - 13:00
### Multiscale modeling and simulation of surfaces in contact: mechanics of contact, friction, and wear I
#### Minisymposium organized by Ramin Aghababaei, David Kammer and Lucia Nicola

**MS7A**  
Room: Hordaland 2 (1F)  
Chair: David Kammer

- From molecular to multi-asperity contacts: the role of roughness in the transient friction response  
  Lucas Ferro, Alexia Crespo, Jaafer El-Awady, Mark Robbins, Juliette Cayer-Barrioz and Denis Mazuyer

- Functional Multilayer Coatings, Simultaneous Experimental and Modeling Approach seeking Ultra-durability  
  Narguess Nemati, Li Ma, Ramin Aghababaei and Dae-Eun Kim

- Wear modelling in elasto-plastic wheel-rail contact problems  
  Andrzej Myśliński and Andrzej Chudzikiewicz

- The degraded surface layer of a tyre tread: A numerical model combining discrete and continuum approaches  
  Kevin Daigle, Guilhem Mallon, Nicolas Fillot, Sylvie Descartes, Romain Jeanneret-Dit-Grosjean and Frederic Blesse

- Quantifying errors due to the Hertzian contact model in multi-sphere Discrete Element Modelling simulations  
  Stephanos Constantinou, Jane Blackford and Kevin Hanley

- A dual-scale method to address plastic deformation in contact problems  
  Mohammad Aramfard, Yaswanth Murugesan, Francisco Perez Rafols and Lucia Nicola

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**TUESDAY**
### CONFERENCE PROGRAMME & TECHNICAL SESSIONS

#### 7/6/22 11:00 - 13:00

**Inverse Problems, Design & Optimization in Heat Transfer**

- **Minisymposium organized by Helcio Orlande, George Dulinovitch, Marcelo Colaço and Zbigniew Bulinski**
- **Room: Ospland (1F)**
- **Chair:** Helcio Orlande
- **CoChair:** Zbigniew Bulinski

| Using Gaussian Process Regression with Coupled Multiphysics FEA Simulations to Enhance Sparse Experimental Data | Rhydian Lewis, Llion M. Evans, Ruben Otin, A. David, L. Hancock, Andrew Davis and Perumal Nithiarasu |
| Optimization of extrusion dies comprised of CAD-compliant microstructures | Jacques Zwart and Stefanie Elijah |
| Structural shape optimization of the thermal concentrator by isogeometric analysis and particle swarm optimization method | Chintan Jansari, Elena Astroshchenko and Stephane P.A. Bordas |
| Stable numerical reconstruction of non-smooth boundary data in steady-state anisotropic heat conduction | Mihai Bucataru, Iulian Cimpean and Liviu Marin |
| Application of the bayesian inverse methods to estimate initial condition for heat transfer problems | Zbigniew Bulinski and Helcio R.B. Orlande |
| Design of the thermal ablation treatment of skin cancer | Luis Ferrera, Leonardo Voron, Helcio Orlande and Bernard Lamiel |

#### 7/6/22 11:00 - 13:00

**Mechanics of wood and biocomposites in engineering**

- **Minisymposium organized by Ani Khaloian, Markus Lukacevic and Jan-Willem van de Kuijlen**
- **Room: Vestfold (1F)**
- **Chair:** Markus Lukacevic
- **CoChair:** Franziska Seeber

| Quantification of spatial inhomogeneous material properties: Wooden laser scanned fibre deviations modelled by Gaussian processes | Catharina Czech, Franziska Seeber, Fabian Duddeke and Ani Khaloian Sarnghi |
| Parameter identification for a cross-laminated timber slab by Bayesian inference | Michael Kowrz, Thomas Furtmüller and Christoph Adam |
| Generation of artificial timber boards with realistic appearance for application of deep-learning algorithms in the wood manufacturing industry | Tadlos Habi, Anders Olsson and Osama Abdeljabber |
| Multi-objective optimization for understanding tree design rules with finite element modelling. | Ezequiel Moreno-Zapata, José M. Cabrera-Ballarin, Germán Ramos-Ruiz and Gustavo Vargas-Silva |
| Finite element analysis of natural fibre composites under impact loading | Simonetta Boria, Giulia Del Bianco and Valentina Grammari |
| A micromechanics-informed beam model of growing wood structures | Antonia Wagner and Stefan Scheiner |

#### 7/6/22 11:00 - 13:00

**Model order reduction - Challenges in engineering and industrial applications IV**

- **Minisymposium organized by Annika Robens-Radermacher, Wil Schilders, Karen Veroy and Chady Ghnatios**
- **Room: A1 – 2**
- **Chair:** Annika Robens-Radermacher
- **CoChair:** Karen Veroy

| Model Order Reduction for State-Space Neural Networks | Anna Shalova |
| Model order reduction applied to a transient heat transfer simulation of a Selective Laser Melting process | Mohamed amine ben yahmed and frank naets |
| PGD model with domain mapping of bead-on-plate weld simulation for wire arc additive manufacturing | Dominic Streli, Annika Robens-Radermacher, Chady Ghnatios, Michael Rethmeier, Andreas Pittner and Jörg F. Unger |
| A stochastic interface scheme for mechanical substructuring problems with large interfaces: an application in electronics | Frank Naets and Sander Neeckx |
| On the stability of PGD reduced-order models for structural dynamics applications | Clément Velia and Serge Prudhomme |
### CONFERENCE PROGRAMME & TECHNICAL SESSIONS

#### 7/6/22 11:00 - 13:00
**Modeling and simulation of highly flexible slender structures IV**  
Minisymposium organized by Martin Arnold, Olivier Bruls, Elena Celledoni, Brynjulf Owren, Damien Durville, José Escaflóna, Johannes Gerstmayr, Gordan Jelenic, Sigrid Leyendecker, Joachim Linn, Tomaz Šuštar, Olivier Thomas and Dejan Zupan  
**Room:** A1 – 3  
**Chair:** Damien Durville

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<td>Third-order time integration scheme for dynamic analysis of cosserat rods</td>
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<td>Eva Zupan and Dejan Zupan</td>
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<td>Inverse Dynamics of Geometrically Exact Beams</td>
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<td>Timo Streibl and Peter Betsch</td>
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<td>Dynamic cable simulation using a damped Cosserat rod model with measured</td>
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<td>stiffness and damping parameters</td>
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<td>Joachim Linn, Fabio Schneider-Jung, Dominik Jungkenn and Fredrik Andersson</td>
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<td>Efficient assessment of noise transmission through highly flexible slender</td>
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<td>Fabio Schneider-Jung, Lilli Burger and Joachim Linn</td>
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<td>Simulating Nonlinear Elastic Behaviour of Cables Using an Iterative Method</td>
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<td>Tian Zhao, Fabio Schneider-Jung, Joachim Linn and Ralf Müller</td>
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#### 7/6/22 11:00 - 13:00
**Computational Vascular Biomechanics**  
Minisymposium organized by T. Christian Gasser, Michael Gee, Thomas Franz and Daniela Valdez-Jassav  
**Room:** A1 – 5  
**Chair:** T. Christian Gasser

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<td>A finite Element Analysis Pipeline for In Silico Annuloplasty on Barlow's</td>
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<td>Diseased Mitral Valve</td>
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<td>Hans Martin Aguilera, Robert Persson, Rune Haaverstad, Stig Urheim, Bjørn</td>
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<td>Skallerud and Victorien Prot</td>
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<td>Design of Stents Using Geometrically and Materially Nonlinear Topology</td>
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<td>Optimization</td>
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<td>Lukas Binderer and Michael W. Gee</td>
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<td>Finite Element Simulation of a Human Left Ventricle using with implanted</td>
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<td>Ventricular Assist Device</td>
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<td>Maximilian R. Schuster and Marek Behr</td>
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<td>A data-informed, patient-specific framework for the quantification of</td>
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<td>abdominal aortic aneurysm rupture risk</td>
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<td>Michael Gee, Lukas Bruder, Jaroslav Pelisek and Hans-Henning Eckstein</td>
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<td>Analysis of wall shear stress and residence time as risk factors in stented</td>
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<td>Anna M. Ranno and Marek Behr</td>
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<td>Modeling pathological blood clotting for the development of next-generation</td>
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<td>anticoagulants</td>
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<td>Tobias Bongartz, Alessio Piergentini, Giulia Rosetti and Marek Behr</td>
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#### 7/6/22 11:00 - 13:00
**Innovative Methods for Fluid-Structure Interaction IV**  
Minisymposium organized by Harald van Brummelen, Trond Kvamsdal and Roger Ohayon  
**Room:** A1 – 4  
**Chair:** Harald van Brummelen

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<td>Space-time fluid-structure interaction with adjoint-based methods for error</td>
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<td>estimation and optimization (Keynote Lecture)</td>
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<tr>
<td>Julian Roth, Jan Philipp Thiele, Thomas Wick and Winfried Wollner</td>
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<td>An arbitrary Lagrangian-Eulerian formulation for Navier-Stokes flow on</td>
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<td>Roger A. Sauer</td>
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<td>Conjugate Heat Transfer Between a Solid and Rarefied Gas</td>
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<td>Doan A.M. van der Woude, Jochem M.W. van Heumen, Michael R.A. Abdelmalik,</td>
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<td>Benjamin Uekermann and E. Harald van Brummelen</td>
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<td>Boundary Element Method for fluid-structure coupling: application to airship</td>
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<td>aeroelastic stability</td>
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<td>Robin Le Mestre, Jean-Sébastien Schotte and Olivier Doaré</td>
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<td>Boundary Element Method for Fluid-Structure coupling: application to aerospace</td>
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<td>Jean-Sébastien SCHOTTE and Robin LE MESTRE</td>
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#### 7/6/22 11:00 - 13:00
**Enabling Industrial Applications Towards Exascale Computing**  
Minisymposium organized by Bastian Koller and Andreas Wierse  
**Room:** A1 – 6  
**Chair:** Andreas Wierse

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<thead>
<tr>
<th>Presentation</th>
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<tr>
<td>Enabling Swedish SMEs and the public sector on EuroHPC JU systems</td>
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<tr>
<td>Lilit Axner and Jeanette Nilsson</td>
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<td>Modelization of a molten salt thermal energy storage for concentrated solar</td>
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<tr>
<td>power.</td>
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<tr>
<td>Jordi Vera Fernandez, Guillem Colomer, Oriol Sammarti and Carlos David Perez</td>
</tr>
<tr>
<td>Towards a European Energy System Virtual Twin:The cost of Renewable</td>
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<td>integration and value of flexibilities</td>
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<tr>
<td>Sandrine Charousset, Wim van Ackooij, Antonio Frangioni, Alfio Lazzaro and</td>
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<tr>
<td>Utz-Uwe Haus</td>
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<tr>
<td>Next-generation HPC models for future Rotorcraft applications</td>
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<tr>
<td>Tommaso Benacchio, Nicoletta Sanguini, Federico Cipolletta, Daniele Malacrida,</td>
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<tr>
<td>Francesco Rondino, Antonio Sclarappa, Ivan Spisso and Luigi Capone</td>
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<tr>
<td>NCC Norway: Use-Cases and Success Stories</td>
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<tr>
<td>Klaus Johannsen, Espen Flage-Larsen, Paul Skjetne and Roger Kvam</td>
</tr>
<tr>
<td>Wind turbine simulations using Xcompact3D toward exascale computing</td>
</tr>
<tr>
<td>Flavio C. C. Galeazzo and Andreas Ruopp</td>
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</table>
### 7/6/22 11:00 - 13:00
**Recent Advances in Exact Model Reduction for Mechanics Problems I**

**Minisymposium organized by Shobhit Jain and Mingwu Li**

**Chair:** Shobhit Jain  
**CoChair:** Mingwu Li

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<thead>
<tr>
<th>Session Title</th>
<th>Details</th>
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<tbody>
<tr>
<td>Reduction of Non-Linearizable Dynamics to Spectral Submanifolds</td>
<td>(Keynote Lecture) George Haller</td>
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<tr>
<td>Non-intrusive Model Reduction via Spectral Submanifolds in Structural and Fluid Dynamics</td>
<td><em>Matthias Cenedese, Balázs Kaszás, Shobhit Jain and George Haller</em></td>
</tr>
<tr>
<td>Variational Autoencoder-boosted physics-based ROM for the treatment of parametric dependencies in nonlinear problems</td>
<td><em>Konstantinos Vlachas, Thomas Simpson, Anthony Garland, Carianne Martinez and Eleni Chatzi</em></td>
</tr>
<tr>
<td>Using spectral submanifolds for nonlinear control</td>
<td><em>Florian Mathis, John I. Alora, Shobhit Jain, Edward Schmerling, Riccardo Bonalli, George Haller and Marco Pavone</em></td>
</tr>
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### 7/6/22 11:00 - 13:00
**Efficient solution techniques for nonstationary flow problems exploiting space-time concurrency I**

**Minisymposium organized by Stefan Turek and Christoph Lohmann**

**Chair:** Stefan Turek  
**CoChair:** Christoph Lohmann

<table>
<thead>
<tr>
<th>Session Title</th>
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<tbody>
<tr>
<td>On the design of global-in-time Newton-Pressure Schur complement solvers for incompressible flow problems</td>
<td>(Keynote Lecture) <em>Christoph Lohmann and Stefan Turek</em></td>
</tr>
<tr>
<td>Multigrid reduction in time for high-order advection via dissipatively corrected coarse-grid operators</td>
<td><em>Hans De Sterck, Robert Falgout and Oliver Krzysik</em></td>
</tr>
<tr>
<td>Application of a modified multigrid waveform relaxation method as a time-simultaneous approach to convection-diffusion equations</td>
<td><em>Jonas Dünsbecker and Stefan Turek</em></td>
</tr>
<tr>
<td>Vectorized implicit time discretions</td>
<td><em>Christian Engwer and Nils-Arne Dreier</em></td>
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### 7/6/22 11:00 - 13:00
**Complex fluid flow in engineering: modeling, simulation and optimization IV**

**Minisymposium organized by Fabian Key, Marek Behr and Stefanie Elgeti**

**Chair:** Marek Behr

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<thead>
<tr>
<th>Session Title</th>
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<tbody>
<tr>
<td>Topology optimization of particle-laden flow problems</td>
<td><em>Casper S. Andreasen, Lukas C. Haghighi and Brice R</em></td>
</tr>
<tr>
<td>A reformulation of the level set equation with built-in redistancing</td>
<td><em>Mathis Fricke, Tomislav Marić and Dieter Bothe</em></td>
</tr>
<tr>
<td>A numerical vinaigrette: effect of surfactants on the oil-water emulsification</td>
<td><em>Fuyue Liang, Juan P. Valdés, Lyes Kahouadji and Omar K. Matar</em></td>
</tr>
<tr>
<td>Direct numerical simulation of the dispersion dynamics of complex flows in static mixers</td>
<td><em>Juan Pablo Valdés, Fuyue Liang, Lyes Kahouadji and Omar Matar</em></td>
</tr>
<tr>
<td>Extended Hybridizable Discontinuous Galerkin (X-HDG) Method for Incompressible Two-Phase Flows</td>
<td><em>Ahmed Sherif, Michel Visonneau, Ganbo Deng and Luís Eça</em></td>
</tr>
<tr>
<td>Topology optimisation of fluid flow in MATLAB: a detailed introduction</td>
<td><em>Joe Alexandersen</em></td>
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### 7/6/22 11:00 - 13:00
**Recent advances in immersed boundary and fictitious domain methods IV**

**Minisymposium organized by Alexander Idesman, Guglielmo Scovazzi, Antonio Lorese, Riccardo Rossi, André Massing, Santiago Badia and Francesc Verdugo**

**Chair:** Guglielmo Scovazzi  
**CoChair:** Andre Massing

<table>
<thead>
<tr>
<th>Session Title</th>
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<tr>
<td>Phi-FEM: a finite element method on domains defined by level-sets</td>
<td>(Keynote Lecture) <em>Michel Duprez, Alexei Lozinski and Vanessa Lleras</em></td>
</tr>
<tr>
<td>A cutfem method for a mechanistic modelling of astrocytic metabolism in 3D physiological morphologies</td>
<td><em>Sofia Farina, Valérie Voorsluys, Susanne Claus, Alexander Skupin and Stéphane P. A. Bords</em></td>
</tr>
<tr>
<td>Unfitted Hybrid High-order Methods for the Acoustic Wave Equation</td>
<td><em>Erik Burman, Omar Duran and Alexandre Ern</em></td>
</tr>
<tr>
<td>A comparison between IBM with feedback forcing and a volume penalization method for compressible flows</td>
<td><em>Lucas Méne, Eric Goncalves, Philippe Parnaudeau and Damien Colombet</em></td>
</tr>
<tr>
<td>A cartesian discontinuous Galerkin solver with immersed boundaries</td>
<td><em>Nayan Levaux, Amaury Biloa, Pierre Schroegen, Vincent Terrapon and Koen Hillewaert</em></td>
</tr>
</tbody>
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### CONFERENCE PROGRAMME & TECHNICAL SESSIONS

#### 7/6/22  11:00 - 13:00
**Robust and scalable numerical methods for wave propagation: design, analysis and application IV**

**Minisymposium organized by Hélène Barucq, Théophile Chaumont-Frelet, Rabia Djellouli and Axel Modave**

**Room:** Jan Mayen 1  
**Chair:** Guglielmo Scovazzi  
**CoChair:** Andre Massing

<table>
<thead>
<tr>
<th>Title</th>
<th>Authors</th>
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<tbody>
<tr>
<td>Efficient computation of modal outgoing Green’s kernels in helioseismology.</td>
<td>Helene Barucq, Florian Faucher, Damien Fournier, Laurent Gizon and Ha Pham</td>
</tr>
<tr>
<td>Atmospheric radiation boundary conditions for the wave equation in helioseismology</td>
<td>Helene Barucq, Florian Faucher, Damien Fournier, Laurent Gizon and Ha Pham</td>
</tr>
<tr>
<td>Low Mach preconditioned non-reflecting boundary conditions for the harmonic balance solver</td>
<td>Pierre Sivel and Christian Frey</td>
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<tr>
<td>An automatic PML for convex domains of general shape in time-harmonic acoustics</td>
<td>Axel Modave and Hadrien Bériot</td>
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<tr>
<td>Domain decomposition preconditioners for non-self-adjoint or non-positive-definite problems</td>
<td>Marcello Bonazzoli, Xavier Cloays, Frédéric Nataf and Pierre-Henri Tournier</td>
</tr>
<tr>
<td>Towards an efficient domain decomposition solver for industrial time-harmonic flow acoustics</td>
<td>Philippe Marchex, Hadrien Bériot, Xavier Antoine and Christophe Geuzaine</td>
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#### 7/6/22  11:00 - 13:00
**Deep Learning Approaches for Applied Sciences and Engineering IV**

**Minisymposium organized by M. Giselle Fernández-Godino, Charles F. Jekel and Christian Gagú**

**Room:** Jan Mayen 3  
**Chair:** M. Giselle Fernández-Godino  

<table>
<thead>
<tr>
<th>Title</th>
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<tbody>
<tr>
<td>Health indicator learning for predictive maintenance based on a triplet loss and deep siamese network</td>
<td>Etienne Jules, Cécile Matrandon and Jean-Marc Bourinet</td>
</tr>
<tr>
<td>Understanding Vehicle Reliability and Safety with Multivariate Sensory Data: A Tire Wear Case Study</td>
<td>Thabang Lebese, Cécile Matrandon, David Clair, Jean-Marc Bourinet, François Deheeger and Rodrigue Decatoire</td>
</tr>
<tr>
<td>Application of multiresolution analysis and deep learning to failure pressure of corroded pipelines</td>
<td>Adriano D. Marques Ferreira, Silvano M. Bastos Alfonso and Ramiro B. Willmersdorf</td>
</tr>
<tr>
<td>Remaining Useful Life prediction with a Deep Self-Supervised Learning Approach</td>
<td>Anastasia Nasopoulou, David Nordsletten, Steven Niederer and Pablo Lamata</td>
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<tr>
<td>A framework for neural network based constitutive modelling of inelastic solid materials</td>
<td>Eugenio J. Muttio-Zavala, Reem Alhayki, Wulf G. Dettmer and Djordje Peric</td>
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#### 7/6/22  11:00 - 13:00
**Advanced Large-Eddy Simulation-based techniques for complex turbulent flows I**

**Minisymposium organized by F.Xavier Trias, Alexey Duben and Roel Verstappen**

**Room:** Lounge A2  
**Chair:** Roel Verstappen

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<thead>
<tr>
<th>Title</th>
<th>Authors</th>
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<tbody>
<tr>
<td>A nonlinear subgrid drift velocity model for filtered drag in turbulent fluidization</td>
<td>Firas Dabbagh and Simon Schneiderbauer</td>
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<tr>
<td>Discretize first, filter next – a new closure model approach</td>
<td>Syver Døving Agdestein and Benjamin Sandeisse</td>
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<tr>
<td>A-priori Analysis of Static and Dynamic Sub-Grid Scale Closures Conditional on the Coherent Structure of the Flow</td>
<td>Josef Hasselberger, Marcel Hampp and Markus Klein</td>
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<tr>
<td>On the effect of Prandtl number to subgrid-scale heat flux models</td>
<td>F. Xavier Trias, Daniel Santos, Janes Hopman, Andrey Gorobets and Assensi Oliva</td>
</tr>
<tr>
<td>Pressure coupling of multiple representative interactive linear eddy models for turbulent combustion spray simulation</td>
<td>Nadia Douchiana, Michael Devermann and Alan Kerstein</td>
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#### 7/6/22  11:00 - 13:00
**Physics-based and data-driven methods for computational cardiology I**

**Minisymposium organized by Pasquale C. Africa, Marco Fedele, Ivan Fumagalli, Stefano Pagani and Francesco Regazzoni**

**Room:** Spitsbergen  
**Chair:** Pasquale Claudio Africa  
**CoChair:** Francesco Regazzoni

<table>
<thead>
<tr>
<th>Title</th>
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<tbody>
<tr>
<td>Boundary integral discretization of the cell-to-cell bidomain model of cardiac electrophysiology</td>
<td>Simone Pezzuto, Giacomo rosilio de Souza and Rolf Krause</td>
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<tr>
<td>The role of scar and border zone geometric features on the genesis and maintenance of re-entrant ventricular tachycardia in patients with previous myocardial infarction: a simulation study</td>
<td>Simone Scarch, Vincenzo Gianti, Piero Colli Franzene, Luca F. Pavarino, Roberto Dore and Cesare Storti</td>
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<tr>
<td>Mathematical modelling and learning in electro-physiology</td>
<td>Dominic Lombardi and Fabien Raphel</td>
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<tr>
<td>Efficient identification of biomechanical properties in cardiac models based on physics-informed neural networks</td>
<td>Federica Cofriana, Francesco Regazzoni, Stefano Pagani, Alfo Quarteroni, Gernot Plank and Gundolf Haase</td>
</tr>
<tr>
<td>Myocardial material parameter estimation in the presence of unknown boundary tractions</td>
<td>Anastasia Nasopoulou, David Nordsletten, Steven Niederer and Pablo Lamata</td>
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</table>
### 7/6/22 11:00 - 13:00
**Multiscale Computational Homogenization for Bridging Scales in the Mechanics and Physics of Complex Materials IV**

**Minisymposium organized by Julien Yvonnet, Kenjiro Terada, Peter Wriggers, Marc Geers, Karel Matous and Paul Steinmann**

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<tr>
<td>11:00</td>
<td>Svalbard</td>
<td>Frédéric Legoll</td>
<td>A deep learning approach for stress tensor field prediction and multiscale modeling of fiber-reinforced composite materials</td>
<td>Ashwini Gupta, Anindya Bhaduri and Lori Graham-Brady</td>
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<td>11:00</td>
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<td>Simulation of phase transformations in polycrystalline shape memory alloys using fast Fourier transforms</td>
<td>Johanna Weimann, Christian Gierden and Stefanie Reese</td>
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<td>11:00</td>
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<td>Microscale numerical simulation of yarn tensile behavior using a high-fidelity geometrical fiber model extracted from micro-CT imaging</td>
<td>Axel Bral, Lode Doelman and Joris Degroote</td>
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<td>11:00</td>
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<td>Prediction of Mechanical Properties of Additively Manufactured Short Fiber Reinforced Composites by Homogenization</td>
<td>Facundo Sosa-Rey</td>
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<td>11:00</td>
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<td>Modeling error estimation based on asymptotic homogenization</td>
<td>Ferrouz Moud, Forest Samuel, Marchand Basile, Feld Nicolas and Parret-Fréaud Augustin</td>
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<td>11:00</td>
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<td>Comparison between direct numerical simulation and homogenization of continuous fiber reinforced woven composites</td>
<td>ANQI LI, Joris J.C. Remmers, Marc G. D. Geers and Thierry J. Massart</td>
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### 7/6/22 11:00 - 13:00
**Mathematical and computational modeling of fluid flow and transport in the brain and central nervous system**

**Minisymposium organized by Vegard Vinje and Timo Koch**

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<tr>
<td>11:00</td>
<td>O – 3</td>
<td>Timo Koch</td>
<td>Computational Model of Passive Water Transport Through the Choroid Plexus</td>
<td>Pooya Razaghi, Vasileios Charitatos and Vartan Kurtcuoglu</td>
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<td>11:00</td>
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<td>The pulsating brain: an interface-coupled fluid-poroelastic model of the cranial cavity</td>
<td>Marius Causemans, Vegard Vinje and Marie E. Rognes</td>
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<td>11:00</td>
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<td>Quantifying the relationship between spreading depolarization and the gymphatic system</td>
<td>Saitok Mukherjee and Jeff Tilhof</td>
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<td>11:00</td>
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<td>Multi-scale models of fluid transport in the brain</td>
<td>Xi Chen, Tamas Jozsa and Stephen Payne</td>
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<td>11:00</td>
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<td>Modeling fluid flow in perivascular networks</td>
<td>Cécile Doversin-Catty, Vegard Vinje, Ingeborg Gjerde, Kent-André Mardal and Marie Rognes</td>
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<td>11:00</td>
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<td>Towards data-integrated simulation of tumours in brain tissue</td>
<td>Marlon Suditsch, Lena Lambers, Tim Ricken and Arnald Wagner</td>
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### 7/6/22 11:00 - 13:00
**Locally refined spline spaces – Properties and structures for different refinement frameworks**

**Minisymposium organized by Tor Dokken, Jessica Zhang, Hendrik Speelers and Falai Chen**

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<td>11:00</td>
<td>O – 4</td>
<td>Tor Dokken</td>
<td>The effect on spline spaces structures and B-spline scaling factors on different approaches to locally refined splines</td>
<td>Tor Dokken</td>
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<td>11:00</td>
<td></td>
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<td>A different take on adaptive splines</td>
<td>Andrea Bressan, Giancarlo Sangalli and Massimiliano Martinelli</td>
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<td>11:00</td>
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<td>Exploiting Tchebycheffian splines in isogeometric discretizations</td>
<td>Krunal Raval, Carla Manni and Hendrik Speelers</td>
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<td>11:00</td>
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<td>Refinement techniques for spline spaces with cloud-based geomiso TNL software</td>
<td>Panagiotis Karakitsios, Panagiotis Kolias, Athanasios Leontaris and George Karaiskos</td>
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<td>11:00</td>
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<td>Refinement strategies for locally linearly independent LR B-splines</td>
<td>Francesco Patrizi</td>
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<td>11:00</td>
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<td>Scattered data approximation by LR B-spline surfaces. A study on refinement strategies for efficient approximation</td>
<td>Vibeke Skytt</td>
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### 13:00 - 14:00
**Lunch Time**
CONFERENCE PROGRAMME & TECHNICAL SESSIONS

7/6/22 11:00 - 13:00
Semi-Plenary Lectures I
Room: B3 + B4
Chair: Mats G. Larson

- Space-time finite element methods
  Olaf Steinbach

- Super-localized numerical homogenization and its links to variational multiscale and isogeometric analysis
  Daniel Peterseim

- Recent results on Virtual Element Methods
  Donatella Marini

- Modeling and simulation of mixed-dimensional problems
  Jan Martin Nordbotten

7/6/22 11:00 - 13:00
Semi-Plenary Lectures II
Room: Svalbard
Chair: Stefan Turek

- Towards data-driven high-fidelity Computational Fluid Dynamics
  Andrea Beck

- Breakthroughs in The Modeling of Shell Structures: IGA and Beyond
  Yuri Bazilev

- Fluid-structure interactions: multiple lock-ins
  Sanjay Mittal

- Recent advances in computational elasto-capillary fluid-solid interaction
  Harald Van Brummelen

7/6/22 14:00 - 16:00
Semi-Plenary Lectures III
Room: Nord – Norge (GF)
Chair: Peter Wriggers

- Applying AI techniques to Model Fluid Flows
  Christopher Pain

- Multi-scale models for mixed human-driven and autonomous vehicles
  Paola Goatin

- Nanoscale thermal transport
  Jianying He

- Computational Models and Experimental methods for the Human Cornea
  Anna Pandolfi

7/6/22 14:00 - 16:00
Semi-Plenary Lectures IV
Room: Sør – Norge (GF)
Chair: Kjell M. Mathisen

- Architected materials as a playground for homogenization
  Dennis Kochmann

- Efficient finite element procedures for bridging the scales in solid mechanics
  Fredrik Larsson

- Modelling of plasticity and fracture across the scales – applications to aluminium alloys
  Odd Sture Hopperstad

- Numerical simulations of powder metallurgy processes
  Jerzy Rojek

16:00 - 16:30
Coffee Break

16:00 - 16:30 | TECHNICAL SESSIONS

7/6/22 16:30 - 18:30
Unsteady Simulation of High-Lift System Aerodynamics
Room: Hedmark (GF)
Chair: Jochen Wild

- A Validation Program for Dynamic High-Lift System Aerodynamics
  Jochen Wild, Henning Strüber, Frédéric Moens, Bart van Rooijen and Hans Maseland

- Krueger High-Lift System Design Optimization
  Emiliano Iuliano, Domenico Quagliarella and Jochen Wild

- Lessons Learnt from Chimera Method Application to a Deploying Krueger Device
  Apurva Hasabnis, Hans Maseland, Frédéric Moens, Aleš Prachar and Jochen Wild

- Scale-resolved simulations of the deployment and retraction of a Krueger high-lift device
  Stefan Wallin, Matteo Montecchia, Peter Eliasson and Aleš Prachar

- Lattice Boltzmann simulation of a deploying Krueger device
  Jorge Ponsin and Carlos Lozan
### Isogeometric Methods V

**Minisymposium organized by Alessandro Reali, Yuri Bazilevs, David J. Benson, René de Borst, Thomas J.R. Hughes, Trond Kvamsdal, Giancarlo Sangalli and Clemens V. Verhoose**

**Chair:** Thomas JR Hughes

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<td><strong>Space-time IGA (Keynote Lecture)</strong></td>
<td>Nord – Norge (GF)</td>
<td>Thomas JR Hughes</td>
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<td></td>
<td>Giancarlo Sangalli, Gabriele Loli, Monica Montardini and Mattia Tani</td>
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<td>Adaptive analysis-aware defeaturing</td>
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<td>Analisa Buffa, Ondine Chanon and Rafael Vázquez</td>
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<td>An isogeometric solver for tensor-product multi-patch geometries</td>
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<td></td>
<td>Michal Bosy, Monica Montardini, Giancarlo Sangalli and Mattia Tani</td>
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<td>Matrix free weighted quadrature for ultra-fast isogeometric thermal modelling</td>
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<td>Joaquín Cornejo Fuentes, David Dureisseix, Arnaud Duval and Thomas Elguejd</td>
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<td>Weighted quadrature rules for hierarchical B-splines</td>
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<td>Carlotta Giannelli, Tadej Kanduč, Massimiliano Martinelli, Giancarlo Sangalli and Mattia Tani</td>
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### Structure-Preserving Reduced Order Models for Fluid Flows

**Minisymposium organized by Benjamin Sanderse, Giovanni Stabile**

**Chair:** Benjamin Sanderse

**CoChair:** Giovanni Stabile

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<td>16:30 - 18:30</td>
<td><strong>POD stabilized methods for incompressible flows: Error analysis and computational results</strong></td>
<td>Nordland (GF)</td>
<td>Benjamin Sanderse, Giovanni Stabile</td>
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<td>Julia Novo and Samuele Rubino</td>
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<td>Data-driven identification of encoding on quadratic-manifolds for high-fidelity dynamical models</td>
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<td>Peter Benner, Pawan Goyal, Jan Heiland and Igor Pontes Duff</td>
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<td>Momentum-conserving ROMs for the incompressible Navier-Stokes equations</td>
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<td>Henrik Rosenberger and Benjamin Sanderse</td>
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<td></td>
<td>Structure-preserving discretization and model order reduction of multi-phase fluid dynamical systems</td>
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<td>Harshit Bansal, Wim Schilders and Nathan van de Wouw</td>
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<td>Conservative stochastic reduced order models for real-time fluid flow data assimilation</td>
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<td>Guillaume Le Pape, Agustin M. Picard, Mathues Ladwig, Valentin Resseguier, Dominique Heitz and Laurent Bessard</td>
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<td>Structure-preserving POD-based forcing for the two-dimensional Euler equations</td>
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<td>Sogy P. Esghrasti, Paolo Cifani, Erwin Luesink, Arnout D. Franken and Bernard J. Geurts</td>
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<td>Structure-preserving hyper-reduction of parametric Hamiltonian systems</td>
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<td>Federico Vismara and Cecilia Pagliantini</td>
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### ECCOMAS Olympiad II

**Room:** Oslo 1 (GF)

**Chair:** Konrad Perzynki

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<td>Oslo 1 (GF)</td>
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<td>Marco Tezzele</td>
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<td>Peridynamic Galerkin methods for nonlinear solid mechanics</td>
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<td>Tobias Bode, Christian Weißenfels and Peter Wriggers</td>
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<td></td>
<td>Direct Numerical Simulations of hypersonic turbulent boundary layers with thermochemical non-equilibrium effects</td>
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<td>Donatello Passioreste</td>
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<td>Acoustic and elastic wave propagation in microstructured media with interfaces: homogenization, simulation and optimization</td>
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<td>Marie Touboul</td>
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<td></td>
<td>Numerical model reduction using POD and spectral decomposition for computational homogenization of porous media</td>
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<td>Fredrik Eide, Fredrik Larsson, Kenneth Runesson and Ralf Jänicke</td>
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### Multiphysics modelling by the lattice Boltzmann method II

**Minisymposium organized by Alessandro De Rosis**

**Chair:** Alessandro De Rosis

**CoChair:** Giovanni Stabile

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<td>A comparative study of 3D Cumulant and Central Moments lattice Boltzmann schemes with interpolated boundary conditions for the simulation of thermal flows in high Prandtl number regime</td>
<td>Oslo 2 (GF)</td>
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<td>Grzegorz Gruszczynski and Lukasz Laniewski-Wołk</td>
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<td>Importance of scalar source term discretization on the second-order convergence of the Lattice Boltzmann Method for reaction-diffusion equation systems</td>
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<td>Michał Dzikowski, Grzegorz Gruszczynski and Lukasz Laniewski-Wołk</td>
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<td>A systematic study of uncertainty quantification for the lattice Boltzmann method in bifurcating geometries</td>
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<td>Jan W.S. McCullough and Peter V. Coweney</td>
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<td>How do bubble curtains protect environment from pollutants? A lattice Boltzmann study</td>
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<td>Yang Zhou, Alessandro De Rosis and Alistair Revell</td>
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<td>Modeling and simulation of a Bingham fluid in a rheometer with the Cumulant lattice Boltzmann method</td>
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<td>Konstantin Kutscher, Martin Geier and Manfred Krafczy</td>
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<td>D2Q9 model of upwind lattice Boltzmann scheme for hyperbolic scalar conservation laws</td>
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<td>Megala Anandan and RaghuRama Rao Suswaram</td>
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<td>Numerical simulation of industrial relevant applications by the ALSIM™ platform</td>
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<td>Ernesto Monaco, Rattandeep Singh and Alexander Stadik</td>
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### Polygonal and Polyhedral Discretizations For Partial Differential Equations II

*Minisymposium organized by Joe Bishop, Michele Botti, Gianmarco Manzini and N. Sukumar*

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<td>A polyhedral finite element formulation using projected gradients and the dual basis with applications to nonlinear solid mechanics</td>
<td>Joseph Bishop</td>
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<td>General mesh discontinuous Galerkin methods and adaptivity</td>
<td>Andrea Cangiani, Zhaonan Dong and Emmanuil H. Georgoulis</td>
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<td>A Mixed Finite Element Formulation for Arbitrary Element Geometries and Nearly-Incompressible Finite Elasticity</td>
<td>Bjorn Sauren, Simon Klarman and Sven Klinkel</td>
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<td>The MH2M method</td>
<td>Franklin Barros, Alexandre Madureira and Frederic Valentin</td>
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<td>Energy-Momentum Preserving Time Integration Schemes for Petrov-Galerkin EAS Mixed Finite Elements</td>
<td>Robin Pfefferkorn, Antonio J. Gil, Rogelio Ortigosa and Peter Betsch</td>
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<td>Efficient Solvers based on Hybrid High Order (HHO) methods for flow simulations in fractured rocks</td>
<td>Alexandre Ern, Florent Hédin, Géraldine Pichot and Nicolas Pignet</td>
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### Advanced materials: computational analysis of properties and performance II

*Minisymposium organized by Vadim V. Silberschmidt and Valery P. Matveenko*

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<td>Investigate the capability of microstructure based computational model to predict the inelastic properties of biopolymer aerogels</td>
<td>Rajesh Chandrasekaran, Markus Hillgärtner, Barbara Milow, Mikhail Itskov and Ameya Rege</td>
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<td>Mechanical and morphological analysis of silica aerogels using a reinforcement learning approach</td>
<td>Raul Abdulsalamov, Prakul Pandit, Mikhail Itskov, Barbara Milow and Ameya Rege</td>
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<td>Plastic-damage model for cyclic loading: phenomenological rule of mixtures approach</td>
<td>Sergio Jiménez, Alejandro Cornejo, Lucia Barbu, Sergio Oller and Eugenio Oñate</td>
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<td>A computational analysis of the influence of micro-scale material imperfections on impact performance of FRP composites</td>
<td>Christopher Gorsky</td>
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<td>Probabilistic analysis of composite materials with hyperelastic components and interface defects</td>
<td>Damian Sokolowski and Marcin Kaminski</td>
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<td>Parametric study of ultrasonic wave propagation in 3D-printed microstructures using the discontinuous Galerkin FE method</td>
<td>Hossein Kamalinia, Andrea Barbarulo, Elsa Vennat, Frederic Champ and Bing Tie</td>
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<td>Photoelasticity of YVO4 through first-principle calculation</td>
<td>amin mirzai</td>
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### CONFERENCE PROGRAMME & TECHNICAL SESSIONS

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<td>MS99E Room: Sar – Norge (GF)</td>
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| Functional implications of renal adaptations in gestational hypertension  
Melissa Stadt and Anita Layton |
| Fluid dynamics of the whole human heart: a multiphysics and multiscale computational model  
Alberto Zingaro, Luca Dedè and Alfio Quarteroni |
| A Multi-Dimensional, Multi-Modality Approach to Optimise Perfusion in Vascular Stent-Grafts  
Scott Black, Craig Maclean, Pauline Hall Barrientos, Konstantinos Ritos and Asimina Kazakidi |
| Integrating in-vivo data in numerical and in-vitro analyses of the hemodynamic in healthy and pathologic thoracic aorta  
Alessandro Mariotti, Emanuele Vignali, Emanuele Gasparotti, Simona Celi and Maria Vittoria Salvetti |
| Variability of atrial blood stasis estimates from patient-specific CFD simulations  
Eduardo Duran, Manuel Garcia-Villalba, Oscar Flores, Pablo Martinez-Legazpi, Alejandro Gonzalo, Elliot McVeigh, Andrew M. Kahn, Javier Bermejo and Juan C. del Alamo |
| Pulmonary hypertension assessed using a fluid mechanics model  
Matte Oldjen, Michelle Bartolo, Mitchel Colebank, Naomi Chesler and Nick Hill |

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<th>7/6/22  16:30 - 18:30</th>
<th>Advances in Numerical Methods for Fluid-Structure Interaction II</th>
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<td><strong>Minisymposium organized by Bernhard Müller, Wolfgang Schröder, Arthur Rizzi, Joris Degroote and Stein Tore Johansen</strong></td>
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<td><strong>Chair: Joris Degroote</strong></td>
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| Direct and sampling-based flutter solution methods in the SU2 solver  
Nikolaos Simiriotis and Rafael Palacios |
| Fluid-structure interaction tool for morphing blades  
Guido Abate and Johannes Riemenschnieder |
| A mass conserving implicit volume penalty method for moving-body flows  
Jason Tsengpiou, Méloidy Cailler, Pierre Bénard, Vincent Moureau, Ghislain Lartigue and Julien Revillon |
| Application of the Generalized-alpha time integration scheme in PFEM for solving the incompressible Navier-Stokes equations  
Eduardo Fernandez, Simon Fevrier, Martin Lacroix, Romain Boman and Jean-Philippe Ponthot |
| An Optimally Stabilized Meshless Method for Compressible Flows Accelerated with Machine Learning  
Ricardo Puente |
| Novel immersed boundary method for fluid-structure interaction of compressible flow  
Frederik Kristoffersen, Martin Larsson, Sverre G. Johnsen, Wolfgang Schröder and Bernhard Müller |

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<th>Computational Intelligence Techniques and Applications in Civil Engineering</th>
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<td><strong>Minisymposium organized by Vagelis Plevris, German Solorzano and Mohamed El Amine Ben Seghier</strong></td>
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| ANN-based surrogate model for predicting the lateral load capacity of RC shear walls  
German Solorzano and Vagelis Plevris |
| A machine learning based approach to predict the stress intensity factors in 2D linear elastic fracture mechanics  
Peijun Zhang |
| Machine-learning driven prediction model for strength reduction of fire-damaged RC column based on numerical analysis  
HyunKyoung Kim |
| Dynamic characterization of offshore wind turbines supported on a jacket using Artificial Neurall Networks  
Román Quevedo-Reina, Guillermo M. Álamo, Luis A. Padrón and Juan J. Aznárez |
| Using artificial intelligence techniques for the accurate estimation of the ultimate pure bending of steel circular tubes  
Mohamed El Amine Ben Seghier, Vagelis Plevris and German Solorzano |
| Investigation of performance metrics in regression analysis and machine learning-based prediction models  
Vagelis Plevris, German Solorzano, Nikolaos Bakas and Mohamed El Amine Ben Seghier |
| Mode shapes-based multicriteria optimization of thin-walled composite cylinders using Deep Learning  
Bartosz Miller and Leonard Ziemiański |
| Topology Optimization Through Machine Learning  
MD Imru Reza Shishir and Alireza Taharnani |
## CONFERENCE PROGRAMME & TECHNICAL SESSIONS

### 7/6/22  16:30 - 18:30
**Computational Structural Stability II**
Minisymposium organized by Herbert A. Mang and Yeong-Bin Yang

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- Effect of various end moments on lateral buckling of cantilevered circular arches
  - Y.B. Yang and Y.Z. Liu

- Efficient robust shape optimization of imperfection sensitive structures using a second-order approximation of the variance
  - Jan C. Krüger and Benedikt Kriegesmann

- Snap-through instability during transmission of rotation by a flexible shaft with intrinsic curvature
  - Yury Vetyukov and Eugenii Oborin

- Theoretical procedure to predict the local buckling resistance of aluminium members in elastic-plastic range
  - Vincenzo Piluso and Alessandro Pisapia

- Form-finding of tensegrity structures via Rank minimization formulations
  - Anton Tkachuk

- Are the terms stiffening/softening structures mechanically unambiguous?
  - Johannes Kalliauer and Herbert Mang

- Role of non-uniform confinement on buckling of rods
  - Ankur Patel and Sumit Basu

### 7/6/22  16:30 - 18:30
**Multiscale modeling and simulation of surfaces in contact: mechanics of contact, friction, and wear II**
Minisymposium organized by Ramin Aghababaei, David Kammer and Lucia Nicola

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- Adhesion and Fracture of Biological and Bio-inspired Soft Two-Dimensional Materials
  - Daniele Liprandi, Federico Bosia and Nicola M. Pugno

- Computational framework for simulation of triboelectric nanogenerators accounting for surface roughness
  - Andrei G. Shvarts, Ignatios Athanasiadis, Lukasz Kaczmarczyk, Charchit Kumar, Guanbo Min, Yang Xu, Daniel M. Mulvihill and Chris J. Pearce

- Consequences of third body vorticity on first bodies
  - Olivier Bouillanne, Guilhem Mollon, Aurélien Saulot, Sylvie Descartes, Nathalie Serres, Guillaume Chassaing and Karim Demmou

- Simple modeling for stiffness evaluation of bolted joints using interfacial element
  - Yoshinao Kishimoto and Yukiyoshi Kobayashi

- Modelling of two-scale contact - Investigation of leakage in polymer seals at cryogenic temperatures
  - Katharina Martin, Johanna Waimann and Stefanie Reese

- Topology optimized structures exploiting internal contact
  - Andreas Frederiksen

- Rich statistics in multi-layered frictional systems: do they come from rich frictional properties?
  - Tom W.J. de Graaf, Samuel Poincloux and Pedro M. Reis
CONFERENCE PROGRAMME & TECHNICAL SESSIONS

7/6/22 16:30 - 18:30
Bone-implant systems: from experiment and simulation to clinical application
Missed symposium organized by Michael Roland, Marcel Orth, Benedikt Braun and Stefan Diebels

- A protocol to evaluate and validate implant internal forces and moments
  Mischa Mühling, Sabrina Sandriesser and Peter Augat

- A methodology for patient-specific simulation of the bone-healing process based on the Cartesian Grid
  Finite Element Method – cgFEM
  Antolín Martínez-Martínez, Enrique Nadal, Héctor Navarro-Garcia, Carlos Gutierrez, Juan José Rídenos and Oliver Allix

- Comparison of five implants for treatment of supracondylar periprosthetic femoral fracture by finite element model
  Magdalena Jansova, Tomas Malotin, Jiri Kren, Petr Votapek, Libor Lobovsky and Ludek Hyncik

- Multiscale optimization of porous implants with a Voronoi based microstructure
  Lucas Colabella, Guillaume Haiat, Salah Naili and Adrian Cisilino

- Experimental determination of material parameters of the human tibia
  Kerstin Wickert, Michael Roland, Annchristin Andres and Stefan Diebels

- Individualized determination of the mechanical fracture environment in lower extremity non-unions - A simulation-based study
  Annchristin Andres, Michael Roland, Kerstin Wickert, Stefan Diebels, Tina Hösting and Benedikt Braun

- A simulation-based virtual laboratory for the determination of minimal fusion areas in tibia pseudarthrosis
  Michael Roland, Stefan Diebels, Bertil Bouillon and Thorsten Tjørds

7/6/22 16:30 - 18:30
Multi-Scale and Multi-Physic Interface Models II
Missed symposium organized by Michele Serpilli, Maria Letizia Raffa, Raffaella Rizzoni, Serge Dumont, Frédéric Lebon, Mikhail Poluektov and Lukasz Figiel

- Derivation of imperfect interface laws for multi-physic composites by a multiscale approach: theoretical and numerical studies
  Serge Dumont, Frédéric Lebon, Raffaella Rizzoni and Michele Serpilli

- Crack propagation in finite elements augmented with embedded interphases
  Marianna Puccia, Antonino Spada and Giuseppe Giambanco

- A multi-physics finite element framework for diffusion-assisted intergranular fracture of polycrystals
  Kim Louisa Auth, Jim Brouzoulis and Magnus Ekh

- Interface-enriched generalized finite element methods for coupling meshes, contact, and topology optimization
  Alejandro M. Aragón, Jian Zhang, Dongyu Liu, Angelo Simone and Fred van Keulen

- A generalized multigrid method for contact problems in Lagrange multiplier based unfitted finite element method
  Hardik Kothari and Rolf Krause

- Numerical studies of kinetics and stability of chemical reaction fronts in solids
  Aleksandr Morozov, Mikhail Poluektov, Alexander Freidin, Lukasz Figiel and Wolfgang H. Müller

- Interface conditions for Stokes-Darcy problems derived via homogenization and boundary layers
  Elissa Eggensweiler and Iryna Rybak
### Conference Programme & Technical Sessions

**7/6/22 16:30 - 18:30**

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<td>Minisymposium organized by Chenfeng Li, George Stefanou and Sei-ichiro Sakata</td>
<td>Response variability of composite structures with random spatially varying material properties</td>
<td>George Stefanou, Dimitrios Savvas, Iason Papaioannou and Panagiotis Gavallas</td>
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<td>Microstructure-informed reduced modes for simulations with fully resolved modular microstructures</td>
<td>Martin Dokcil, Jan Novák, Petr Krýsl and Jan Zeman</td>
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<td>Random field modelling of local strength in randomly arranged unidirectional FRP plate under transverse tensile loading</td>
<td>Sei-ichiro Sakata, George Stefanou, Shin Tanimasa and Shungo Araki</td>
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<td>A Machine-Learning Approach for Digital Reconstruction of Heterogeneous Microstructures</td>
<td>Jilong Fu and Chenfeng Li</td>
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<td>A computational framework for modelling graphene nanoplatelets</td>
<td>Panagiotis Gavallas, Dimitrios Savvas and George Stefanou</td>
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<td>Image-based 3D Reconstruction and Modelling of heterogeneous battery electrode microstructure</td>
<td>Vinícius Hoagla, Artem Kulachenko, Stefan Lindström and Henrik Ekström</td>
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<td>Strength estimation of composite material by peridynamics considering random field modelling of inclusions</td>
<td>Yuki Arai and Sei-ichiro Sakata</td>
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<td><strong>Well-balanced schemes for hyperbolic systems with source terms</strong></td>
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<td>Minisymposium organized by Christophe Berthon, Manuel J. Castro Díaz and Victor Michel-Danso</td>
<td>A fully well-balanced scheme for shallow-water equations with Coriolis force</td>
<td>Vivien Desveaux and Alice Masset</td>
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<td>Well-balanced semi-implicit Lagrange-projection-type schemes for the one-dimensional shallow water system</td>
<td>Celso Caballero Cárdenas, Manuel J. Castro Díaz, Tomás Morales de Luna and María de la Luz Muñoz Ruiz</td>
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<td>Bound-preserving and entropy-stable algebraic flux correction schemes for the shallow water equations with topography</td>
<td>Hennes Hajduk and Dmitri Kuzmin</td>
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<td>Well-balanced methods for one-dimensional blood flow model with discontinuous mechanical and geometrical properties</td>
<td>Ernesto Pimentel-García, Carlos Parés, Lucas O. Müller and Eleuterio F. Toro</td>
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<td>Modeling and numerical approach of dispersive waves in geophysical flows</td>
<td>Cipriano Escalante and Tomás Morales de Luna</td>
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<td>Well-balanced high-order schemes for hyperbolic systems with stiff relaxation</td>
<td>Irene Gómez Bueno, Sebastiano Boscaino, Manuel Jesús Castro, Carlos Parés and Giovanni Russo</td>
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<td>Towards entropy–stability finite element moment methods for the Boltzmann equation</td>
<td>Michael Abdelmalik, Irene Gamba, Torsten Kessler and Sergey Rjasanow</td>
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**7/6/22 16:30 - 18:30**

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<td><strong>Innovative Methods for Fluid-Structure Interaction V</strong></td>
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<td>Minisymposium organized by Harald van Brummelen, Trond Kvamsdal and Roger Ohayon</td>
<td>A monolithic Finite Element formulation for the hydroelastic analysis of Very Large Floating Structures</td>
<td>Oriol Colonès, Francesc Verdugo, Ido Akkerman and Sjoerd van Hooff</td>
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<td>A partitioned approach for strongly coupled fluid-structure interaction in an industrial valve system</td>
<td>Ahmed Aissa Berrias, Harald van Brummelen and Ferdinando Auricchio</td>
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<td>Simulation of wind induced excitation of a membrane structure with ponding water</td>
<td>Novaneth Kodunthirappully Narayanan, Roland Wüchner and Joris Degroote</td>
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<td>FS1 co-simulation around elongated bodies with a minimal intrusive interface for the beam solver</td>
<td>Alban Leroyer, Gan Bo Deng, Emmanuel Guilmineau, Patrick Queutey, Michel Visonneau and Jeroen Wackers</td>
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<td>Fluid-Structure Interaction (FSI) simulation for Thermo-elasto-plastic treatment</td>
<td>Ibra Khalil, Ramy Nemer, Aurelien Larcher, Rudy Valette and Elie Hachem</td>
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<td>Wall-resolved LES simulation of vortex-induced vibration of wind turbine blades</td>
<td>Mohsen Lahooti, Rafael Palacios and Spencer Sherwin</td>
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### CONFERENCE PROGRAMME & TECHNICAL SESSIONS

**7/6/22 16:30 - 18:30**

**Modelling Diffusion in Solids**  
**Minisymposium organized by Andrés Díaz**

- Deformation, fracture, and diffusion in solids: formulation of continuum theories  
  *Fernando Duza*

- A finite element model for diffusion-induced fracture in dual graphite battery electrodes  
  *Eduardo Roque, Javier Segurado and Francisco Montero-Chacón*

- Full simulation of electrolyte and metals including boundary interactions  
  *Tim Hageman and Emilio Martínez-Pañeda*

- Impact of the nature and the distribution of triple junctions on the diffusion of hydrogen in micro and nano structured Nickel  
  *Mohamad el sayed, Jomaa Bouhattate, Abdelali Oudriss, Antoine Falaize and Xavier Feaugas*

- Diffusion-convection-reaction framework for coupled hydrogen transport in metals: implementation in Comsol and stabilization analysis  
  *Andrés Díaz, Iván Cuesta, Jesús Manuel Alegre and Emilio Martínez-Pañeda*

**7/6/22 16:30 - 18:30**

**Recent Advances in Exact Model Reduction for Mechanics Problems II**  
**Minisymposium organized by Shobhit Jain and Mingwu Li**

- Exact nonlinear model reduction via direct computation of spectral submanifolds in finite element problems  
  *Shobhit Jain and George Haller*

- Data-driven modeling of the transition across equilibrium states in plane Couette flow  
  *Bálint Kaszás, Mattia Cenedese and George Haller*

- Recent advances on spectral-submanifold-based model reduction: internal resonances and configuration constraints  
  *Mingwu Li, Shobhit Jain and George Haller*

- Reduced-order model for large amplitude vibrations of flexible structures coupled with a flow  
  *Théo Flament, Jean-François Deu, Antoine Placzek, Mikel Balmaseda and Duc-Minh Tran*

**7/6/22 16:30 - 18:30**

**Advances on computational methods for multiphase flows with phase change I**  
**Minisymposium organized by Luis Brandt, Marica Pelanti and Maria Giovanna Rodio**

- Numerical methods for diffuse interface multifluid models  
  *Clément Le Touze and Nicolas Rutard*

- Derivation of models and numerical methods for homogenized multiphase flows based on stochastic ideas  
  *Vincent Perrier*

- An acoustic/transport splitting method for the isentropic Baer-Nunziato two-phase flow model  
  *Fabio A. Amezu, Samuel Koh, Marc Massot, Marica Pelanti and Teddy Pichard*

- Two-phase flow reduced-order model with polydisperse oscillating droplets  
  *Arthur Loison, Marc Massot, Teddy Pichard and Samuel Koh*

- Mathematical and numerical analysis of a simplified model for boiling flows  
  *Teddy Pichard*

- Cluster-induced turbulence modelling of mass transfer in gas-particle flows  
  *Stefanie Bauchhenzerauer and Simon Schneiderbauer*

- Effect of Laser Beam Scattering in SPH-Simulation of Deep Penetration Laser Beam Welding  
  *Daniel Sollich, Florian Fetzer and Peter Eberhard*

**7/6/22 16:30 - 18:30**

**Efficient solution techniques for nonstationary flow problems exploiting space-time concurrency II**  
**Minisymposium organized by Stefan Turek and Christoph Lohmann**

- Parallel time-stepping for fluid-structure interactions  
  *Nils Margenberg and Thomas Richter*

- Investigating time-scale conditions for the time-parallelization of turbulent flows simulation  
  *Thibault Lunet*

- Scalability analysis and performance modelling of layer-parallel training of deep residual networks using a non-linear multigrid-in-time algorithm  
  *Chinmay Datar and Harald Kösler*

- Higher order space-time discretizations of the Navier-Stokes equations on evolving and fixed domains  
  *Mathias Anselmann and Markus Bause*
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<td>Complex fluid flow in engineering: modeling, simulation and optimization V</td>
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<td>Shape Optimisation of Turbomachinery Components</td>
<td>Bernhard Semlitsch</td>
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<td>Comparison of gradient-based and genetic algorithms for infinite-swept wing airfoil shape optimization</td>
<td>Daniel Simanowycz, Anand Sudhi, Alexander Theiss, Camil Badrya and Stefan Hein</td>
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<td>Optimising the Design and Operation of Ultrasound-based Flow Meters using Computational Fluid Dynamics</td>
<td>Mario J. Rincon, Martino Reclari and Abkar Mahdi</td>
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<td>Topology optimization of turbulent flow manifolds</td>
<td>Lukas C. Haegeli, Ole Sigmund and Casper Schousboe Andersen</td>
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<td>Topology optimization of conjugate heat transfer in microchannel heatsinks</td>
<td>Brice Rogic and Casper Schousboe Andersen</td>
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<td>Topography optimisation for parallel plate heat exchangers</td>
<td>Yupeng Sun and Joe Alexandersen</td>
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<td>7/6/22 16:30</td>
<td>Recent advances in immersed boundary and fictitious domain methods V</td>
<td>Alexander Idesman, Guglielmo Scovazzi, Antonio Larose, Riccardo Rossi, André Massing, Santiago Badia and Frances Verduque</td>
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<td>Andre Massing, Guglielmo Scovazzi</td>
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<td>A novel cutcell method and its application to the incompressible Navier-Stokes equations</td>
<td>Alejandro Quirós Rodríguez, Tomas Fullana, Vincent Le Chenadec and Taraneh Sayadi</td>
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<td>Penalized direct-dorcing method and power-law-based wall model for immersed-boundary numerical simulations of obstacles in turbulent flow</td>
<td>Idris Hamadache, Michel Belliard and Pierre Sagaut</td>
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<td>Coastal engineering applications of CutFEM for fluid-structure interaction</td>
<td>Christopher E. Kees</td>
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<td>High-Order simulations of droplets and bubbles employing extended methods</td>
<td>Florian Kummer</td>
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<td>Towards a better prediction of aerodynamic coefficients in an immersed boundary context</td>
<td>Benjamin Constant, Stéphanie Péron, Héloise Beaugendre and Benoît Christophe</td>
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<td>Anisotropic adaptive body-fitted meshes for CFD</td>
<td>Sacha El Ayadi, Aurelien Larcher and Elie Hachem</td>
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<td>Robust and scalable numerical methods for wave propagation: design, analysis and application V</td>
<td>Hélène Barucq, Théophile Chaumont-Freiet, Raba Djellouli and Axel Modave</td>
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<td>Advances in Time-Dependent Wave-Based Obstacle Identification Methods</td>
<td>Dan Givoli, Daniel Rabinovich, Amit Sayag and Eli Turkel</td>
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<td>Stabilization of the high-order discretized wave equation for data assimilation problems</td>
<td>Tiphaine Delaunay, Sébastien Imperiale and Philippe Moireau</td>
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<td>Explicit time-stepping for electromagnetic wave propagation through structure-preserving spline differential forms</td>
<td>Bernard Kapidani and Rafael Vázquez</td>
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<td>Finite element procedure for wave propagation of nearly incompressible elasticity using mixed time integrator</td>
<td>Takahiro Yamada</td>
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<td>Explicit Hybrid High-Order (HOO) methods for the wave equation</td>
<td>Morgane Steins, Alexandre Ern, Olivier Jamond and Florence Drui</td>
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<td>Fast mass lumped multiscale wave propagation modelling</td>
<td>Sjoerd Geevers and Roland Majer</td>
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<td>Heterogeneous asynchronous time integrator in nonlinear dynamics: seismic nonlinear analysis of crane bridge and concrete gravity dams through co-simulation</td>
<td>Michael Brun, Siija Li, Florent DE Martin, Fatima Fekak, Nicolas Richart and Anthony Gravouil</td>
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<td>Computational Problems for Charge Transport in Low Dimensional Structures</td>
<td>Luigi Barletti, Giovanni Mascali and Vittorio Romano</td>
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<td>Luigi Barletti, Giovanni Mascali</td>
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<td>Quantum corrections to electron hydrodynamics in graphene</td>
<td>Luigi Barletti, Lucio Demeo and Sara Nicoletti</td>
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<td>Thermal and electro-thermal properties of a graphene sheet</td>
<td>Giovanni Mascali</td>
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<td>Hydrodynamical model for charge transport in a graphene FET</td>
<td>Vito Dario Camiola and Vittorio Romano</td>
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<td>Simulation of a GNR-FET</td>
<td>Giovanni Nastasi and Vittorio Romano</td>
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<td>Implementation on GPU of a solver for the Schroedinger-Poisson block in confined devices</td>
<td>Francesco Vecil and José Miguel Mantos Ruiz</td>
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<td><strong>Advanced Large-Eddy Simulation-based techniques for complex turbulent flows II</strong>&lt;br&gt;Minisymposium organized by F.Xavier Trias, Alexey Duben and Roel Verstappen</td>
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<td>F.Xavier Trias</td>
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<td>On the assessment of wall-modeled LES strategies for the CRM-QLH&lt;br&gt;0 Lehmkull, S Gomez and A. Lozano-Duran</td>
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<td>Wall-modelled LES of boundary layer separation from a smooth ramp&lt;br&gt;Timofey Mukha and Philipp Schlatter</td>
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<td>Large-eddy simulations of turbulent compressible supersonic jet flows using discontinuous Galerkin methods&lt;br&gt;Diego P. Abreu, Carlos Junqueiro-Junior, Eron T. V. Dauricio and João Luiz F. Azevedo</td>
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<td>Towards proper subgrid-scale model for jet aerodynamics and aeroacoustics&lt;br&gt;Alexey P. Duben, Jesus Ruano, F. Xavier Trias and Andrey V. Gorobets</td>
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<td>Towards efficient prediction of near-wall transition in scale-resolving simulations&lt;br&gt;Eike Tangermann and Markus Klein</td>
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<td><strong>Physics-based and data-driven methods for computational cardiology II</strong>&lt;br&gt;Minisymposium organized by Pasquale C. Africa, Marco Fedele, Ivan Fumagalli, Stefano Pagani and Francesco Regazzoni</td>
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<td>Fast automatic segmentation of mitral valve structures from 3D transesophageal echocardiography for transcatheter procedures: training and validation of a 3D U-Net convolutional neural network&lt;br&gt;Simone Saitta, Riccardo Munafò and Emiliano Votta</td>
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<td>Non-invasive pressure estimation in cerebral aneurysm: comparison among 4D flow MRI, CFD and 4DVar&lt;br&gt;Riccardo Munafò, Simone Saitta and Alberto Redaelli</td>
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<td>A numerical investigation of haemodynamic abnormalities in Turner syndrome aortae&lt;br&gt;Lauren Johnston, Ruth Allen, Avril Mason and Asimina Kozokidi</td>
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<td>Noninvasive Assessment of Ventricular-Arterial Coupling: from Theory to Applications&lt;br&gt;Mohamed Zaid, Salman Ahmad, Laurel Despins, Mihail Popescu, James Keller, Marjorie Skubic, Craig A. Enter and Giovanna Guidoboni</td>
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<td>Energy preserving reduced-order cardiovascular models for augmented hemodynamics monitoring&lt;br&gt;François Kimmig, Jessica Manganotti, Sebastien Imperiale and Philippe Moireau</td>
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<td>Time calibration of a novel phenomenological thrombus formation model through global sensitivity analysis and a Bayesian approach&lt;br&gt;Gian Marco Melina, Alireza Jafarinia, Sascha Ranftl, Wolfgang von der Linden, Thomas Hochrainer and Katrin Ellermann</td>
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<td>An accurate, robust, and efficient finite element framework for anisotropic, nearly and fully incompressible elasticity&lt;br&gt;Elias Karabelas, Matthias Gsell, Gundolf Hoase, Gernot Plank and Christoph Augustin</td>
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<td><strong>Multiscale Computational Homogenization for Bridging Scales in the Mechanics and Physics of Complex Materials V</strong>&lt;br&gt;Minisymposium organized by Julien Yvonnet, Kenjiro Terada, Peter Wriggers, Marc Geers, Karel Matous and Paul Steinmann</td>
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<td>Numerically efficient two-scale modelling of the electro-chemically coupled transport of electroactive species&lt;br&gt;Vinh T. Vu, Kenneth Runesson, Fredrik Larsson and Ralf Jänicke</td>
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<td>Variationally consistent computational homogenization of the chemo-mechanical properties of nanoporous electrode materials with application to Li-ion batteries&lt;br&gt;David R. Rollin, Fredrik Larsson, Kenneth Runesson and Ralf Jänicke</td>
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<td>Thermo-mechanically coupled transient two-scale analysis for dissipative composites&lt;br&gt;Sesshiro Matsubara, So Nagashima, Dai Okumura and Kenjiro Terada</td>
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<td>Thermo-electrochemistry-swelling-flow analysis of battery cells: an interdisciplinary multi-scale challenge&lt;br&gt;Omar Bettinotti, Youngwon Hahn and Victor Oancea</td>
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<td>Numerical homogenization and the Arlequin method&lt;br&gt;Frederic Legoll</td>
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<td>Improved multiscale finite element methods for advection-diffusion problems&lt;br&gt;Rutger A. Biezemans</td>
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<td>Non-intrusive two-scale coupling strategy of non-compatible models for the tolerance analysis of composite structures to local features&lt;br&gt;Pierre-Alain Guidoult, Maxence Wangermez, Olivier Allix, Oana Ciobanu and Christian Rey</td>
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### Conferences Programme & Technical Sessions

**7/6/22 16:30 - 18:30**

#### Inelasticity at finite strains: models, identification and numerics

**Minisymposium organized by Ralf Landgraf, Bernhard Eidel and Alexey V. Shuto**

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<td>A mixed Finite Element method for 3D in-elasticity problems at large strains with weakly imposed symmetry</td>
<td>Lukasz Kaczmarczyk, Christophe-Alexandre Chalons-Mouris and Chris Pearce</td>
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<td>Multifield plasticity approach for scalable large strain simulations of Incremental Cold Flow Forming</td>
<td>Karol Lewandowski, Daniele Barbera, Andrew McBride, Paul Steinmann, Chris Pearce and Lukasz Kaczmarczyk</td>
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<td>Inelastic finite strain asphalt model including damage and healing – implementation into coupled tire-pavement-simulations</td>
<td>Ines Wollny and Michael Kaliske</td>
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<td>Multidimensional Rank-One Convexification of Incremental Damage Formulations: Algorithmic Treatment, Implementation Aspects, and Numerical Analysis</td>
<td>Maximilian Köhler, Timo Neumeier, Malte A. Peter, Daniel Peterseim and Daniel Balzani</td>
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<td>Systematic regularization of finite strain elastoplastic models</td>
<td>Mohamed Abatour, Samuel Forest, Kais Ammar, Cristian Ovalle, Nikolay Osipov and Stéphane Quilici</td>
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<td>A gradient-extended anisotropic damage-plasticity model in the logarithmic strain space</td>
<td>Hagen Hothusen, Tim Brepols, Jaan-Willem Simon and Stefanie Reese</td>
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<td>Influence of uncertainties in material parameters on finite element simulations of sandwich structures</td>
<td>Pranav Kumar Dileep, Stefan Hartmann, Wei Hua, Heinz Paikowski, Tobias Fischer and Gerhard Ziegmann</td>
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#### Advanced Beam Models - Development and Application

**Minisymposium organized by Ioannis Tsiptsis, Evangelos Sapountzakis and Kai-Uwe Bletzinger**

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<td>An extended beam element for piping analysis - Application to pipe whip phenomena</td>
<td>Youri Pascal-Abdellaoui, Claude Stolz, Frédéric Daude, Philippe Lafon and Pascal Galon</td>
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<td>Tangential differential calculus for curved, linear Kirchhoff beams with systematic convergence studies</td>
<td>Michael Kaiser and Thomas-Peter Fries</td>
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<td>The influence of beam kinematic assumptions in a beam contact benchmark</td>
<td>Armin Bosten, Vincent Denoël, Alejandro Cosimo, Joachim Linn and Olivier Brüls</td>
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<td>Efficient geometrically exact formulation for curved beams</td>
<td>Emma La Malfa Ribolla, Martin Horák and Milan Jirásek</td>
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## Wednesday, June 8th

### 8/6/22 09:00 - 10:30
**Plenary Lectures II**

**Chair:** Leszek F. Demkowicz

**Approximating functions, functionals and operators with neural networks for diverse applications**

*George Karniadakis*

**Nonlinear Preconditioning for Implicit Solution of Discretized PDEs**

*David Keyes*

### 10:30 - 11:00
**Coffee Break**

### 11:00 - 13:00 | TECHNICAL SESSIONS

**8/6/22 11:00 - 13:00**
**EU-Funded Research and Innovation on Computational Methods towards Climate Neutrality of Aviation I**

**Chair:** Dietrich Knoerzer

**Contributions of EU-funded projects managed by CINEA towards climate neutrality of aviation**

*Leonidas Sozos-Rousouls*

**Aero-acoustic installation effects in disruptive aircraft architectures**

*Christophe Schram, Alessandro Zorrí, Julien Christophe and Hadrien Beriot*

**Aeroacoustic analysis of a landing-gear configuration for noise reduction using porous fairings in the INVENTOR project**

*P. Alexandros Koutsoukos, Daniele Ragni and Francesco Avallone*

**Uncertainty Quantification of Composite Structures with Manufacturing Defects within the SuCoHS Project**

*Benedikt Kriegesmann, Georgios Balokas and Tobias Wille*
### CONFERENCE PROGRAMME & TECHNICAL SESSIONS

#### 8/6/22 11:00 - 13:00
**Isogeometric Methods VI**

- **Minisymposium organized by** Alessandro Reali, Yuri Bazilevs, David J. Benson, René de Borst, Thomas J.R. Hughes, Trond Kvamsdal, Giancarlo Sangalli and Clemens V. Verhoosel
- **Room:** Nord – Norge (GF)
- **Chair:** JS Chen

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<thead>
<tr>
<th>Optimization methods and inverse approaches for molding processes</th>
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<td>Florian Zwicke and Stefanie Elgeti</td>
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<th>A Parallel Adaptive Arc-Length Method</th>
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<td>Hugo Verhelst, Matthias Möller and Henk Den Besten</td>
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<th>Genuinely nonlinear stabilization techniques for fluid flow problems</th>
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<td>Bohumir Bastl, Marek Brandner, Kristyna Sloba and Eva Turnerova</td>
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<th>PSYDAC: a high-performance finite element library in Python</th>
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<td>Yaman Güçlü, Said Hadjout and Ahmed Ratnani</td>
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<th>Isogeometric Analysis of Acoustic Scattering with Perfectly Matched Layers</th>
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<td>Jon Vegard Vends and Trond Kvamsdal</td>
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#### 8/6/22 11:00 - 13:00
**Computational Analysis of Concrete in an Experimental-Virtual-Lab I**

- **Minisymposium organized by** Jörg Schröder, Steffen Anders, Dominik Brands, Günther Meschke and Michael Kaliske
- **Room:** Nordland (GF)
- **Chair:** Stefan Löhnert

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<tr>
<th>Phase-Field Modeling for Damage in Steel-Fiber Reinforced High Performance Concrete at Low Cycle Fatigue: Numerical Calibration And Experimental Validation</th>
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<td>Dominik Brands, Mangesh Pise, Jörg Schröder, Gregor Gebuhr and Steffen Anders</td>
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<th>A multi-scale approach to localized damage indicators of a short-fibre reinforced high-performance concrete</th>
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<td>Ursula Weiss, Philipp Löff, Oliver Fischer, Polina Pugacheva, Christian U. Grosse, Michael Engelhard, Dirk Volkmer and Malte A. Peter</td>
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<th>Numerical and experimental investigations of high-performance fiber-reinforced concrete under cyclic tensile loading</th>
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<td>Vladislav Gudžulić, Niklas Schöfer, Rolf Breitenbücher and Günther Meschke</td>
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<th>A microplane model for textile reinforced concrete at finite strains.</th>
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<th>Re-anchoring of the cut wires of a grouted seven-wire strand: experimental and numerical studies</th>
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<td>Jonas Aparrizo, Tien Hoang, Gwendal Cumunel, Gilles Forêt, Yannick Jeannen and Julien Castres Saint Martin</td>
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<th>Computational generation of mesoscale concrete finite element models from voxel dataset</th>
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<td>Koussay Daadouch, Vladislav Gudžulić and Günther Meschke</td>
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#### 8/6/22 11:00 - 13:00
**EYIC Junior Workshop I**

- **Minisymposium organized by** Nikolaus Adams and Jörg Schumacher
- **Room:** Oslo 2 (GF)
- **Chair:** Nikolaus Adams

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<th>Introduction to shape optimization</th>
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#### 8/6/22 11:00 - 13:00
**Data-driven numerical and reduced order modeling of flows I**

- **Minisymposium organized by** Nikolaus Adams and Jörg Schumacher
- **Room:** Akershus (1F)
- **Chair:** Bastian Oesterle

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### 8/6/22 11:00 - 13:00
**Block preconditioning for challenging multiphysics systems I**  
**Minisymposium organized by Peter Ohm, John N. Shadid and Matthias Mayr**

- Augmented Lagrangian block preconditioners for incompressible resistive magnetohydrodynamics *(Keynote Lecture)*  
  Fabian Laakmann, Patrick Farrell and Lawrence Mitchell

- Parallel space-time multilevel methods with application to electrophysiology  
  Pietro Benedusi, Carlo Garoni, Patrick Zulian, Paola Ferrari, Stefano Serra-Capizzano, Michael Minion and Rolf Krause

- Block preconditioning of a Semi-Implicit Gyrokinetic Model of Fusion Plasmas  
  Lee Rickerson, Milo Dorr, Debjayoti Ghosh and Mikhail Dorf

- On Scalable Preconditioners for Implicit Continuum Multiphysics Plasma Systems  
  John Shadid, Jesus Bonilla, Peter Ohm, Ray Tuminaro, Jonathan Hu, Michael Craddock and Roger Pawlowski

- Block preconditioning and a monolithic AMG method for magnetic confinement fusion relevant resistive MHD simulations  
  Peter Ohm, Jesus Bonilla, Jonathan J. Hu, John N. Shadid and Raymond S. Tuminaro

### 8/6/22 11:00 - 13:00
**Recent developments and current issues in the phase-field modeling of fracture I**  
**Minisymposium organized by Dhananjay Phansalkar, Paras Kumar, Pietro Carrara, Sigrid Leyendecker, Julia Mergheim, Laura De Lorenzis and Paul Steinmann**

- An anisotropic damage model with crack orientation director and gradient-extension *(Keynote Lecture)*  
  Stephan Wulfinghoff and Christian Dorn

- A phase-field model with an extended hydrostatic-deviatoric strain energy density splitting scheme  
  Parnian Hesammokri, Haiyang Yu and Per Isaksson

- Phase-field fracture model with new hybrid spectral-directional energy split based on gradient smoothing technique  
  Krešimir Jukić, Tomislav Jarak and Zdenko Tonković

- Phase-field Modeling of Fracture in Materials with Anisotropic Fracture Energy  
  Sindhup Nathar, Ulrich Römer, Hermann G Matthies and Laura De Lorenzis

### 8/6/22 11:00 - 13:00
**Advanced Modelling Procedures for Masonry Structures I**  
**Minisymposium organized by Daniela Addessi, Miguel Cervera and Elio Sacco**

- A shell-based computational framework for the static limit analysis of masonry domes under horizontal forces  
  Nicola A. Nodari and Paolo Bisegna

- Limit analysis of non-periodic masonry by means of Discontinuity Layout Optimization  
  Matteo Schiantella, Matthew Gilbert, Colin C. Smith, Linwei He, Federico Cluni and Vittorio Gusella

- Minimum thickness of masonry domes and vaults subjected to vertical loads: a parametric study by thrust surface analysis  
  Francesco Barsi, Riccardo Barsotti and Stefano Bennati

- On the existence of compression-only discrete force networks that support assigned sets of nodal forces  
  A. Amendola, O. Mattei, A. Fortunato, P. Seppecher, F. Fraternali and G.W. Milton

- A finite-element-based unit cell approach for simulating vertically perforated clay block masonry  
  Raphael Reismüller, Markus Lukacevic, Thomas Kiefer and Josef Füss
CONFERENCE PROGRAMME & TECHNICAL SESSIONS

8/6/22 11:00 - 13:00  
Modelling of environment-assisted fracture I  
Minisymposium organized by Haiyang Yu and Zhiliang Zhang

- Exploring the role of H-induced stress fields and H-H interactions in hydrogen embrittlement by atomistic simulations  
  (Keynote Lecture)  
  Ali Tehranchi, Tilman Nickel and Joerg Neugebauer

- Hydrogen-induced transgranular to intergranular fracture transition in bi-crystalline Nickel  
  Yu Ding, Haiyang Yu, Jianying He and Zhiliang Zhang

- Internal-stress-induced 3D brittle crack propagation within the configurational mechanics framework  
  Ignatios Athanasiadis, Lukasz Kaczmarszyk, Andrei Shvarts, Karol Lewandowski and Chris Pearce

- Single-edge notched tension testing for assessing hydrogen embbrittlement: a numerical study of test parameter influences  
  Robin Deproeters, Margo Cauwels, Wim De Woel, Tom Depover, Kim Verbeken and Stijn Hertele

- A predictive model unifying hydrogen enhanced plasticity and decohesion  
  Meichao Lin, Haiyang Yu, Yu Ding, Vigdis Olden, Antonio Alvaro, Jianying He and Zhiliang Zhang

8/6/22 11:00 - 13:00  
Towards Next Generation of Industrial Aerodinamical Simulation Tools I  
Minisymposium organized by Oriol Lehmkuhl, Eusebio Valero and Jordi Pons

- Alya towards Exascale: efficient finite element assembly on GPUs for LES  
  Herbert Owen, Oriol Lehmkuhl, Guiloume Houzeaux, Guillermo Oyarzun, Georg Hager, Gerhard Wellein and Dominik Ernst

- An Immersed Boundary Method for the CFD Solver Airbus-CODA  
  Víctor J. Llorente, Diego Lodares, Esteban Ferrer and Eusebio Valero

- Critical evaluation of feature detection algorithms based on modal decomposition methods  
  Beka Begashvili, Jesús Garicano Mena, Soledad Le Clainche and Eusebio Valero Sánchez

- Efficient implementation of a high-order compressible Navier-Stokes equations solver running on Graphics Processing Units  
  Fernando Gigubert, Adrián Sotillo and Jesús Pueblas

- A runtime-based dynamic mesh partitioning approach  
  Giacomo Baldan, Ricard Borrell and Jens Jögerskiöper

8/6/22 11:00 - 13:00  
Innovations in phase-field modeling, computation and Experimental Validation I  
Minisymposium organized by FADI Aldakheel, Yousef Heider, Thomas Wick, Roberto Alessi and WaiChing Sun

- Analysis of nonsmooth multigrid for phasefield brittle fracture  
  (Keynote Lecture)  
  Oliver Sander, Carsten Gräser and Daniel Kienle

- Phase field modelling of hydrogen assisted fracture  
  Emilio Martín-Zarza, Philip Kristensen, Alireza Golahnam and Christian Nordson

- Level-set topology optimization of fracture-resistance of macro structure undergoing ductile failure  
  Nima Naji, Hassan Ali Jahangiry, Fadi Aldakheel and Peter Wriggers

- Regularised Fracture Models Based on Representative Crack Elements  
  Johannes Storm and Michael Kaliske

- Virtual Elements for Phase Field Modelling of Fracture in K-L Plates  
  Blaž Hudobivnik, Fadi Aldakheel and Peter Wriggers

8/6/22 11:00 - 13:00  
Advances in high-order discretisation methods and model reduction methods for CFD problems I  
Minisymposium organized by T. Taddei and A. Ferrero

- Efficient hyperreduction of high-order discontinuous Galerkin methods  
  (Keynote Lecture)  
  Masayuki Yuan

- Model order reduction for physics-based machine learning  
  Laura Mainini

- An adaptive projection-based model reduction method for nonlinear meachanics with internal variables: application to thermo-hydro-mechanical systems  
  Angelo Iollo, Giulia Sambataro and Tommaso Taddei

- A reduced order model for the optimisation-based domain decomposition algorithm for the incompressible Navier-Stokes equations  
  Ivan Prusak, Monica Nonino, Francesco Ballarin and Gianluigi Rozza

- An entropy-stable discontinuous Galerkin approximation of the Spalart-Allmaras turbulence model for the compressible Reynolds Averaged Navier-Stokes equations  
  Diego Lodares, Juan Manzanero, Esteban Ferrer and Eusebio Valero
## CONFERENCE PROGRAMME & TECHNICAL SESSIONS

### 8/6/22  11:00 - 13:00  Reliability analysis and rare event simulation. I

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- Estimating Approximate Control Variate Weights: with Applications in Importance Sampling and Rare Event Simulation
  - *Alex Gorodetsky* and *Trung Pham*

- Reliability updating of engineering systems by multi-level cross entropy method
  - *Gianfrédio Kajiali*, Iason Papaioannou and Daniel Straub

- Rare event probability estimation through high-dimensional elliptical distribution modeling
  - *Marie Chiron*, Christian Genest, Jérôme Morio, Sylvain Dubreuil and Michel Salouin

- Sensitivity of reliability-based optimum designs: Implementation to stochastic linear systems
  - *Danko J. Jerez*, Hector A. Jensen and Michael Beer

- Rare event uncertainty quantification based on Hamiltonian MCMC approaches and the Approximate Sampling Target with Post-processing Adjustment (ASTPA) framework
  - *Kostas G. Papakonstantinou*, *Ehsayed Eshra* and *Hamed Nikbakht*

- Rare event estimation using sequential directional importance sampling
  - *Kai Cheng* and *Iason Papaioannou*

### 8/6/22  11:00 - 13:00  Multiphase flows with surface tension and capillarity I

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- A level-set model for two-phase flow with variable surface tension: Thermocapillary and surfactants
  - *Nestor Vinicio Belcazar Arciniega*, Joaquim Rigola and Assensi Oliva Llena

- Computational homogenization of unsteady incompressible two-phase flows with obstacles
  - *Modesar Shakoor* and *Chung Hoe Park*

- Multiscale simulation of void growth using automatic anisotropic adaptive meshing and a level finite element approach
  - *Lorys Le Gohebel*, Luisa Silva, Steven Le Corre, Hugues Dignonnet, Tuan-Linh Nguyen and Stéphanie Collou

- Regularizing curvature for the unstructured VOF method
  - *Jun Liu*, Luise Nagel, Tobias Tolle, Anja Lippert and Tomislav Maric

- A discrete differential geometric formulation of multiphase surface interfaces for scalable multiphysics equilibrium simulations.
  - *Stefan Endres*, Lutz Mädler and Marc Avila

- A robust SPH-based surface tension scheme for laser melting simulations
  - *Manzi Afrasiab*, Christof Lüthi and Markus Bambah

### 8/6/22  11:00 - 13:00  Data-driven and projection-based reduced order models for computational sciences and engineering I

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<th>Minisymposium organized by Gianluigi Rozza and Giovanni Stabile</th>
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- ANN-reconstruction of nonlinear operator in projection-based ROM for elastic structures
  - *Christophe Hoareau*, Lan Shang and Andreas Zillinger

- Nonlinear manifold ROM with Convolutional Autoencoders and Reduced Over-Collocation method
  - *Francesco Romor*, Giovanni Stabile and Gianluigi Rozza

- Projection-based reduced order models for nonlinear thermal simulations of automotive battery packs
  - *Bartosz Górecki*, Michael Kuryzynka and Robert Tyckö-Crow

- A Reduced-Order Model based in nonlinear multidimensionality reduction: a kernel Proper Orthogonal Decomposition.
  - *Pedro Diez*, *Alba Muixi*, *Alberto García-González* and *Sergio Zlotnik*

- A novel non-linear ROM strategy for steady-state elastohydrodynamic line contact problems and its applicability to lubricated contact in multibody
  - *Leoluca Scurria*, Tommaso Tammarozzi, Pavel jianek and Dieter Fauconier

- A symplectic model order reduction method for large-scale seismic wave propagation
  - *Muhammad Hamza Khalid*, Rhys Hawkins, Matthias Schliotmann and *Kathrin Smetana*

### 8/6/22  11:00 - 13:00  Discrete conservation properties for fluid flows: from fundamentals to applications I

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<th>Minisymposium organized by N. Valle, F. X. Trias, F. Capuano, G. Coppola and R.W.C.P. Verstappen</th>
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- Matrix properties associated with discrete conservation in flow simulations (Keynote Lecture)
  - Arthur E.P. Veldman and Gennaro Coppola

- An energy-preserving unconditionally stable fractional step method on collocated grids
  - *Daniel Santos Serrano*, F. Xavier Trias Miguel, Guillem Colomer Rey and Assensi Oliva Llena

- A modified Navier-Stokes model: Validation cases and a convergent numerical scheme
  - *Magnus Svärd*

- Convergence of a finite-volume method with strong-weak imposition of boundary conditions
  - *Anna Giesteland* and *Magnus Svärd*

- Discrete Conservation in Meshfree Methods for Fluid Flows
  - *Pratik Sachde*
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<tr>
<td>8/6/22</td>
<td>11:00 - 13:00</td>
<td>Computational Analysis of Advanced Materials and Structures I</td>
<td>A1 – 4</td>
<td>Efstathios Theotokoglou</td>
<td>Ioannis K. Giannopoulos</td>
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<td></td>
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<td>Postbuckling failure mechanism of square aluminum plates under shear loading</td>
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<td>A mechanically consistent damage model based on the representation theory of invariant tensor functions</td>
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<td>Thermal and structural modelling of thermoset composite repairs towards optimization of the cure cycle for minimum distortion</td>
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<td>Crack Propagation Simulation using communicating user subroutines to predict complex crack growth</td>
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<td>A method for communication between user materials during runtime in Abaqus®</td>
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<td>8/6/22</td>
<td>11:00 - 13:00</td>
<td>Simulation-based optimization considering dynamic systems and/or uncertainty I</td>
<td>A1 – 5</td>
<td>Martin Siebenborn</td>
<td>Benedikt Kriegesmann</td>
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<td>The lPGDZ+ technique for compressing primal solution time-series in unsteady adjoint - applications &amp; assessment</td>
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<td>Adjoint shape optimization of arterial bypass-graft anastomoses considering fluid-structure interaction</td>
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<td>Unsteady Aerodynamic Sensitivity Analysis with FEniCS</td>
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<td>Gradient-Based Optimization of Structures Immersed in an Acoustic Cavity Using XFEM, ROM and Surrogate Model</td>
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<td>8/6/22</td>
<td>11:00 - 13:00</td>
<td>Advances on computational methods for multiphase flows with phase change II</td>
<td>A1 – 6</td>
<td>Sébastien Tanguy</td>
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<td>Numerical simulations of cavitation near an elastic object</td>
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<td>Application of interface capturing schemes on multiphase/multicomponent compressible flow of underwater explosion</td>
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<td>Modelling the evaporation of CO2 during depressurization using physics-based mass-transfer source terms</td>
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<td>A diffuse interface method with non-instantaneous relaxation for two-phase flows described by generic equations of state</td>
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<td>A time-staggered CFD scheme for variable density moist air Flow</td>
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<td>A novel cutcell method for interfacial flows - application to phase change</td>
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<td>8/6/22</td>
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<td>Reduced order modeling of dynamical systems through deep learning techniques I</td>
<td>B1 – 1</td>
<td>Andrea Manzoni</td>
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<td></td>
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<td>Simultaneous learning of dynamics and coordinates, with examples in fluid dynamics</td>
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<td>Bayesian inference for the learning of reduced-state dynamics</td>
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<td>Model reduction of parameterized PDEs using deep bases</td>
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<td>Deep learning of dynamical systems using geometry and thermodynamics</td>
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<td>Physics-constrained deep learning-based reduced order models for parametrized PDEs</td>
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### CONFERENCE PROGRAMME & TECHNICAL SESSIONS

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<td>Mechanics of soft, multifunctional materials: Experiment, modeling and simulation I</td>
<td>Minisymposium organized by Mokarram Hossain, Daniel Garcia-Gonzalez and Ruike Zhao</td>
<td>MS82A</td>
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<td>MS82A</td>
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<td>Chair: Rogelio Ortigosa, Michael Gross</td>
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<td>CoChair: Michael Gross</td>
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<td><strong>Magnetomechanical deformations and instabilities in soft magnetoactive materials</strong></td>
<td>(Keynote Lecture)</td>
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<td>Stephan Rudykh, Nitesh Arora and Parag Pathak</td>
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<td>Weakly coupled electro-magneto-thermo-mechanical model for shape memory polymer composites employing mixed-FEM</td>
<td>Vinayak Gholap, Ludovic Noels and Christophe Geuzaine</td>
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<td>Simulation of soft robots with nonlinear material behavior using the cosserat rod theory</td>
<td>Malte Grube and Robert Selfried</td>
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<td>Magneto-pseudoelasticity emerging from multistable microstructures of extremely soft magnetorheological elastomers</td>
<td>Matthias Rambausek, Michael Neunteufel and Joachim Schöberl</td>
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<td>Modeling and analysis of electro-magneto-elastic membrane structures</td>
<td>Awantika Mishra, Yadwinder Singh Joshan and Sushma Santapuri</td>
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<td>8/6/22</td>
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<td>Complex fluid flow in engineering: modeling, simulation and optimization VI</td>
<td>Minisymposium organized by Fabian Key, Marek Behr and Stefanie Elgeti</td>
<td>MS12F</td>
<td>Fabian Key</td>
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<td>MS12F</td>
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<td>Chair: Fabian Key</td>
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<td>Flow diodes for application in turbulent flows</td>
<td>Christian Jordan, Bahram Haddadi, Johannes Wintersperger, Johannes Szivosz and Michael Harasek</td>
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<td>A mixed midelity conceptual design process for Boundary Layer Ingestion concepts</td>
<td>Olivier Atinault, Michael Meheut and Sebastien Defoort</td>
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<td>Objective identification of local vortices</td>
<td>Bjarn Holmedal and Lars Erik Holmedal</td>
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<td>High fidelity simulations of flow and acoustic fields around rotating tire toward aeroacoustic noise reduction</td>
<td>Kenzo Asada, Keita Hizen, Atsushi Toyoda, Kozo Fuji, Toshiyuki Ikeda and Masataka Koishi</td>
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<td>8/6/22</td>
<td>11:00 - 13:00</td>
<td>Near-Wall Reactive Flows: Simulation, Modelling And Validation</td>
<td>Minisymposium organized by Amsini Sadiki, Suad Jakirlic, Christian Hasse and Andreas Dreizler</td>
<td>MS85A</td>
<td>Marius Schmidt, Tobias Kern and Ulrich Maas</td>
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<td>MS85A</td>
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<td>Chair: Marius Schmidt, Tobias Kern and Ulrich Maas</td>
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<td>CoChair: Marius Schmidt, Tobias Kern and Ulrich Maas</td>
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<td>Boundary layer flow measurements in a motored IC engine at engine speeds up to 2500 rpm</td>
<td>Marius Schmidt, Cooper Welch, Lars illmann, Andreas Dreizler and Benjamin Böhm</td>
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<td>Flame surface density and mean reaction rate measurements in a side-wall quenching flame at elevated pressure</td>
<td>Pascal Jahn, Florian Zentgraf, Max Greiferstein, Robert Barlow, Benjamin Böhm and Andreas Dreizler</td>
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<td>Modelling of the joint probability function in turbulent flame-wall interaction of premixed flames using Quadrature-based Moment Methods and tabulated chemistry</td>
<td>Matthias Steinhausen, Thorsten Ziryes, Federica Ferraro, Sebastian Popp, Feichi Zhang, Henning Bockhorn and Christian Hasse</td>
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<td>REDIM reduced kinetics for Flame-Wall Interactions including Flame Retardants and the investigation of its Sensitivity with respect to the gradient estimation</td>
<td>Christina Strassacker, Tobias Kern and Ulrich Maas</td>
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<td>REDIM based model reduction of the decomposition of urea-water-solutions in films and droplets</td>
<td>Etele Berszényi, Marcus Stein, Viatcheslav Bykov and Ulrich Maas</td>
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<td>Numerical investigation of Hydrogen self-ignition and deflagration-to-detonation phenomena using automated meshing approach and detailed chemistry</td>
<td>Marius Gabri Cojocaru, Lorenzo Sufrà and Pietro Scienna</td>
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<td>Computational Plasticity in Crystals and Polycrystals I</td>
<td>Minisymposium organized by Luiza Angheluta, Jorge Vinals, Marco Salvaglio and Stefanos Papanikolaou</td>
<td>MS100A</td>
<td>Luiza Angheluta</td>
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<td>MS100A</td>
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<td>Chair: Luiza Angheluta</td>
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<td>Microscopically Informed Continuum Dislocation Dynamics</td>
<td>Benedikt Weger, Satyapriya Gupta and Thomas Hochrainer</td>
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<td>Modeling elastic and plastic deformations using the amplitude expansion of the phase-field crystal model</td>
<td>Marco Salvaglio</td>
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<td>A comparison of an efficient crystal plasticity finite element method and a spectral solver</td>
<td>Tomas Manik, Arash I. Aria, Hassan M. Asadkandi and Bjarn Holmedal</td>
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<td>A phase field crystal theory of the kinematics and dynamics of dislocation lines</td>
<td>Vidar Stangell, Luiza Angheluta, Audun Skauge, Marco Salvaglio and Jorge Villal</td>
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<td>Field Dislocation Mechanics and Phase Field Crystal models</td>
<td>Luiza Angheluta and Jorge Vinals</td>
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### CONFERENCE PROGRAMME & TECHNICAL SESSIONS

#### 8/6/22  11:00 - 13:00
**Multiphase Flow and non-Newtonian Fluid – Modelling and Applications I**
- **Minisymposium organized by Chenfeng Li**
- **Room: Jan Mayen 3**
- **Chair: Eduardo de Souza Neto**
- **CoChair: Chenfeng Li**

- **A CFD-DEM Approach for Modelling Fresh Concrete Flow** *(Keynote Lecture)*
  - Sizeng You and Chenfeng Li

- Cells-centered Lagrangian scheme for multi-material flows with equal pressure assumption
  - Rémi Chauvin, Guisset Sébastien, Manoch-Perennou Bastien and Llor Antoine

- Computational modelling and characterization of non-Newtonian visco-plastic cementitious building materials
  - Mareike Thiedeitz, Jithender J. Timothy and Thomas Kränkel

- CFD-DEM simulation of large particle behaviour in slurry pumps: effect of outlet orientation
  - Nicolas Torino, Konstantinos Ritos and William Dempster

- Fluidization by gas pore pressure of dense granular flows: numerical simulations versus experiments
  - Alvaro Aravena, Laurent Chupin, Thierry Dubois and Olivier Roche

#### 8/6/22  11:00 - 13:00
**Deep Learning in Scientific Computing I**
- **Minisymposium organized by Manuel Jesus Castro Diaz, Siddharta Mishra and David Pardo**
- **Room: Lounge A2**
- **Chair: David Pardo**
- **CoChair: Manuel J. Castro**

- Variational Physics Informed Neural Networks: an a priori error estimate
  - Stefano Berrone, Claudio Canuto and Moreno Pintore

- Parametrized Flow Predictions using Physics Informed Neural Networks
  - Simon Wassing, Stefan Langer and Philipp Bekemeyer

- On quadrature rules for solving Partial Differential Equations with Neural Networks
  - Ian Ander Rivera, Ángel Javier Omella, Jamie M. Taylor and David Pardo

- A Deep r-Adaptive Mesh Method for solving Partial Differential Equations
  - Ángel J. Omella and David Pardo

- Accelerating High Order Discontinuous Galerkin solvers using neural networks
  - Esteban Ferrer, Fernando Manrique de Lara and Khier-eddine Othmani

- A Generative Adversarial Networks approach for solving Partial Differential Equations
  - Carlos Uriarte, David Pardo, Judit Muñoz-Matute and Ignacio Muga

#### 8/6/22  11:00 - 13:00
**Multi-fidelity methods for uncertainty quantification and optimization I**
- **Minisymposium organized by Lorenzo Tamellini, Matteo Diez, John Jakeman and Alex Gorodetsky**
- **Room: Spitsbergen**
- **Chair: Lorenzo Tamellini**

- Advanced Experiments on Gaussian Process-based Multi-fidelity Methods over Diverse Mathematical Characteristics
  - Sihmetmet Yildiz, Hayriye Pehlivan-Solak, Matteo Diez, Omer Goren and Melike Nikbay

- Multi-Fidelity Sparse Polynomial Chaos and Kriging Surrogate Models for Uncertainty Quantification
  - Markus P. Rumpfkeil and Phil Beran

- Multifidelity ductile failure model by cokriging between simulations on unit cells and random microstructures
  - Clément Cadet, Jacques Besson, Sylvain Flouriot, Samuel Forest, Pierre Kerfriden, Laurent Lacourt and Victor de Rancourt

- Domain-aware multifidelity learning for design optimization
  - Francesco Di Fiore and Laura Mainini

- Multi-fidelity active learning for shape optimization problems affected by noise
  - Jeroen Wackers, Riccardo Pellegrini, Matteo Diez, Andrea Serani and Michel Visonneau

- Comparing two multi-fidelity methods for forward uncertainty quantification of ship resistance
  - Chiara Piazzola, Lorenzo Tamellini, Riccardo Pellegrini, Riccardo Bradia, Andrea Serani and Matteo Diez
## CONFERENCE PROGRAMME & TECHNICAL SESSIONS

### 8/6/22 11:00 - 13:00

**Multiscale Computational Homogenization for Bridging Scales in the Mechanics and Physics of Complex Materials VI**

**Minisymposium organized by Julien Yvonnet, Kenjiro Terada, Peter Wriggers, Marc Geers, Karel Matous and Paul Steinmann**

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#### MS6F

- **Hierarchy of generalized continua issued from micromorphic medium constructed by homogenization**
  - Jean-François Ganghoffer, Ehsan Alavi and Mojtaba Sadighi

- **Homogenization of higher-order continua**
  - Felix Schmidt and Christian Hesch

- **Meshfree Modelling of Coupled Mechanical-Thermal-Chemical Phenomena in Energetic Aggregates at Multiple Length Scales**
  - Judith Brown, Frank Beckwith, Wolf Ki Tae, Joel Clemmer, Caleb Overstreet and Marcial Gonzalez

- **Efficient coarse-graining of boundary surface for solving Atomistic/Continuum multiscale problems using Green's function**
  - Ankit Gupta and William Curtin

- **An investigation of the effects of change in crystal structure on the mechanical properties of nanocrystalline aluminum using a continuum-atomic multiscale bridging method**
  - Yusuke Yamazaki, Takahiro Murashima and Mayu Muramatsu

- **Microstructure-informed modelling of open-porous cellular materials**
  - Shivangi Aney, Barbara Milow and Ameya Rege

### 8/6/22 11:00 - 13:00

**Structure-Preserving Finite Element Methods in Computational Fluid Dynamics I**

**Minisymposium organized by Philip Lederer and Christian Merdon**

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#### MS142A

- **Direct numerical simulations of turbine blade cascades for the improvement of turbulence models through database generation**
  - Michel Rasquin, Jean-François Thomas, Koen Hillewaert, Patrick Bechlars and Matthias Franke

- **Turbulence Modeling Approach for Exactly Mass-conserving Finite Element Methods**
  - Xavier Moslelehner

- **A new projection method for Navier-stokes equations by using Raviart-thomas finite element**
  - Giacomo Barbi, Andrea Chierici, Antonio Cervone, Valentina Giovacchini, Sandra Manservisi, Lucio Sirota and Ruben Scardovelli

- **A gradient-robust well-balanced scheme for the compressible Navier-Stokes problem**
  - Christian Merdon

- **Finite element exterior calculus applied to incompressible Navier-Stokes equations**
  - Marien-Lorenzo Hanot

### 8/6/22 11:00 - 13:00

**Modeling complex fluid and solid dynamics during earthquake ruptures I**

**Minisymposium organized by Fabian Barras, Gaute Linga, François Renard, Omar Duran and Eirik Keilegavlen**

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#### MS48A

- **Numerical simulations of mixed shear and opening modes fluid driven fracture propagation on pre-existing discontinuities**
  - Brice Lecampion, Alexis Sáez and Regina Fakhretdinova

- **Reduced dimension fracture flow – Beyond Poiseuille flow models**
  - Bruce Gee and Robert Gracie

- **Reduced dimension fracture flow – Deformable fractures coupled with inertial and transient fluid behaviour**
  - Bruce Gee and Robert Gracie

- **The Transient Phase of Planar, Three-Dimensional Buoyant Hydraulic Fractures Emerging from a Point Source**
  - Andreas Méri, Carlo Peruzzo and Brice Lecampion

- **When, and for how long, two tough layers can contain the propagation of a fracture driven by the injection of a viscous fluid**
  - Carlo Peruzzo, Judith Capron and Brice Lecampion

- **Coupling solid and fluid dynamics within rapidly growing fractures**
  - Fabian Barras, Gaute Linga, Eirik Grude Flekkøy and François Renard

### 13:00 - 14:00

**Lunch Time**
### CONFERENCE PROGRAMME & TECHNICAL SESSIONS

#### 14:00 - 16:00 | TECHNICAL SESSIONS

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<td><strong>EU-Funded Research and Innovation on Computational Methods towards Climate Neutrality of Aviation II</strong></td>
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<td>SENeca project: Climate effects assessment of supersonic aviation</td>
<td>Etienne Terreneau, Sigrun Matthes, Robin Thor, David Lee, Ruben Rodriguez de Leon, Lim Ling, Bethan Owen, Agnieszka Skroworow, Påløpe Leyland, David Marsh and Kateryna Dmytrylo</td>
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<td>Reduced order computational methods for the development of the propulsive technologies for supersonic aviation to achieve climate neutrality</td>
<td>Ali Can Ispir, Bora Orcun Cakir, Karel Van den Borre, Francesco Civerra, Alessandro Tognelli and Bayindir H. Saracoglu</td>
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<td>The role of computational methods to predict pollutant and GHG emissions from future supersonic civil aircraft using biofuels or H2</td>
<td>Christer Fureby, Arvid Åkerblom, Thommie Nilsson, Martin Passad, Elna Heimdal-Nilsson, Guido Saccone, Bayindir Saracoglu, Nicole Viola and Roberta Fusaro</td>
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<td><strong>Bayesian inference of engineering models: advances in theory and applications I</strong></td>
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<td>Minisymposium organized by Oindrila Kanjilal, Iason Papaioannou, Dainiel Straub, Geert Lombaert and Costas Papadimitriou</td>
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<td>A Bayesian inference approach for parametric identification through optimal control method</td>
<td>Mainak Bhattacharyya and Pierre Feisiel</td>
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<tr>
<td>Parameter identification in dynamic fracture model by using Bayesian inference</td>
<td>Mijo Nikolic, Andjelka Stanic, Noemni Friedman and Hermann Mattthes</td>
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<tr>
<td>Bayesian system identification and dynamic virtualization using incomplete noisy measurements</td>
<td>Dominik Teymour, Omid Sadehi, Lambros S. Katsafadiotis and Costas Papadimitriou</td>
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<tr>
<td>Bayesian uncertainty quantification and model selection for complex fluids</td>
<td>Anica Rinkens, Clemens V. Verhaegel and Nick O. Joensson</td>
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<tr>
<td>A Reduced Basis Ensemble Kalman Method</td>
<td>Francesco Silha, Cecilia Pagliantini, Martin Grepl and Karen Veroy</td>
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<tr>
<td>A theoretical and numerical study on the Scaled Spherical Simplex filter with n+2 sigma points and its UKF equivalency for recursive Bayesian estimation</td>
<td>Kostas G. Papakonstantinou, Gordon P. Warn and Mariyam Amir</td>
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<tr>
<td><strong>Computational Analysis of Concrete in an Experimental-Virtual-Lab II</strong></td>
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<tr>
<td>Minisymposium organized by Jörg Schröder, Steffen Anders, Dominik Brands, Günther Meschke and Michael Kaliske</td>
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<tr>
<td>Accelerating high-cycle fatigue life estimation using XFEM and gradient enhanced damage model</td>
<td>Jian Sun and Stefan Löhnert</td>
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<tr>
<td>A gradient-enhanced fatigue damage model to simulate compressive fatigue behaviour of high-strength concrete</td>
<td>Stefan Leehnert and Nadja Oeschke</td>
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<tr>
<td>Confined cyclic shear behavior of concrete studied using the microplane model MS1</td>
<td>Mario Aguilar, Abedulgader Baktheer, Henrik Becks, Martin Classen and Rostislav Chudoba</td>
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<tr>
<td><strong>EYIC Junior Workshop II</strong> (limited to 100 pre-registered participants)</td>
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<td>Minisymposium organized by Jörg Schumacher and Jörg Schröder</td>
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<tr>
<td>Parallel Schwarz domain decomposition preconditioning and an introduction to FROSCh</td>
<td>Alexander Heulin</td>
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<tr>
<td><strong>Data-driven numerical and reduced order modeling of flows II</strong></td>
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<tr>
<td>Minisymposium organized by Nikolaus Adams and Jörg Schumacher</td>
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<tr>
<td>Reinforcement learning for discretization-aware LES models</td>
<td>Marius Kurz and Andrea Beck</td>
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<tr>
<td>Correcting the discretization error of coarse grid CFD simulations with machine learning</td>
<td>Anna Kienzer, Stefan Langer and Philipp Bekemeyer</td>
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<tr>
<td>Learning and Inference assisted by Feature Space Engineering (LIFE): A generalizable approach for data-driven augmentation of Physical Models</td>
<td>Karthik Duraisamy, Vishal Srivastava and Niloy Gupta</td>
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<tr>
<td>Data set generation at novel test-rig for validation of numerical models using in-house algorithms</td>
<td>Agata Wlodarczak, Marcin Nowak, Dawid Sukienik, Kari Myöhänien, Markku Nikku, Alessandro Parente and Wojciech Adamczyk</td>
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<tr>
<td>Solving partial differential equations using physics informed cascade neural network</td>
<td>Seyedalborz Manavi, Ehsan Fattahi and Thomas Becker</td>
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<tr>
<td>Exploration of data-driven numerical methods for fluid flows by end-to-end optimization</td>
<td>Aaron Buhendwa, Deniz Bezgin and Nikolaus Adams</td>
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### Conference Programme & Technical Sessions

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<td>8/6/22 14:00 - 16:00</td>
<td><strong>Block preconditioning for challenging multiphysics systems II</strong>&lt;br&gt;Minisymposium organized by Peter Ohm, John N. Shadid and Matthias Mayr</td>
<td>MS38B&lt;br&gt;Room: Rogaland (GF)</td>
<td>Peter Ohm</td>
<td>John N. Shadid</td>
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<td>8/6/22 14:00 - 16:00</td>
<td><strong>Advanced Modelling Procedures for Masonry Structures II</strong>&lt;br&gt;Minisymposium organized by Daniela Addessi, Miguel Cervera and Elio Sacco</td>
<td>MS71B&lt;br&gt;Room: Sør – Norge (GF)</td>
<td>Elio Sacco</td>
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<td>8/6/22 14:00 - 16:00</td>
<td><strong>Recent developments and current issues in the phase-field modeling of fracture II</strong>&lt;br&gt;Minisymposium organized by Dhananjay Phansalkar, Paras Kumar, Pietro Carrara, Sigrid Leyendecker, Julia Mergheim, Laura De Lorenzis and Paul Steinmann</td>
<td>MS67B&lt;br&gt;Room: Romerike (GF)</td>
<td>Paras Kumar</td>
<td>Stephan Wulfinghoff</td>
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<tr>
<td>8/6/22 14:00 - 16:00</td>
<td><strong>Recent Trends in Scientific Computing for Computational Fluid Dynamics and Solid Mechanics II</strong>&lt;br&gt;Minisymposium organized by Stefan Turek, Axel Klawonn and Uli Rüde</td>
<td>MS41B&lt;br&gt;Room: Oslo 1 (GF)</td>
<td>Stefan Turek</td>
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#### MS38B - Room: Rogaland (GF)

- Using AMG as an eigensolver to improve smoothed aggregation for AMG<br>Silvia Ehrmann
- A block preconditioner for equilibrium equations in mechanics with a second gradient of dilatation regularization<br>Ana C. Ordonez, Carola Kruse, Nicolas Tardieu and Daniel Ruiz
- A Scalable Block Preconditioner for Coupled Thermo-Hydro-Mechanics Problems<br>Ana Ordonez, Nicolas Tardieu, Carola Kruse and Daniel Ruiz
- An accelerated deflation preconditioner for parametric systems based on subspace recycling<br>Dionysios Panagiotopoulos, Wim Desmet and Elke Deckers

#### MS67B - Room: Romerike (GF)

- On the generalization of gradient-based models from 1d to 3d: Curvature-dependence of phase-field modeling of brittle fracture<br>Patrick Kurzeja, Kai Langenfeld and Jörn Mosler
- Continuous-discontinuous modeling of crack growth with the thick level set method<br>L.A.T. Mororó, A. Post and F.P. van der Meer
- A phase-field framework for cohesive fracture<br>Henning Lammen and Jörn Mosler
- Phase-field modeling of brittle fracture in heterogeneous bars<br>Pietro Carrara, Francesco Freddi and Laura De Lorenzis
- Numerical modeling of fracture propagation in bi-layered materials using an adaptively refined phase-field method<br>Salman Khan, Alba Muixí, Chandrasekhar Annavarapu and Antonio Rodríguez-Ferran
- A Hybrid High Order method for gradient damage models<br>David Siedel, Helfer Thomas, Fonfeur Olivier, Besson Jacques, Forest Samuel and Anmar Kais

#### MS71B - Room: Sør – Norge (GF)

- Applied element modelling for seismic assessment of masonry buildings with flexible roofs<br>Ahsana Parammal Vatteri, Rohit Kumar Adhikari and Dina Diayala
- Dynamic response of masonry walls: from harmonic to non-stationary excitations<br>Daniela Addessi, Cristina Gatto and Fabrizio Vestrini
- Distinct element modelling of the seismic response of historical masonry constructions: insight on the out-of-plane collapse of façades<br>Pietro Meriggi, Rebecca Fugger, Francesca Gabbin, Stefano De Santis and Gianmarco de Felice
- Architectural and environmental impact of retrofitting techniques to prevent in-plane «domino» failure modes of unreinforced masonry buildings<br>Riccardo Liberotti, Federico Cluni, Francesco Faralli and Vittorio Gusella

#### MS41B - Room: Oslo 1 (GF)

- Robust coarse spaces for domain decomposition methods<br>Alexander Heinlein, Axel Klawonn, Martin Lanser, Adam Wasioek and Janine Weber
- Large scale computational homogenization using the FE² method for contact problems<br>Axel Klawonn, Martin Lanser, Oliver Rheinbach and Matthias Uran
- Application of FROSch - the Fast and Robust Overlapping Schwarz Preconditioner framework - to Chemo-Mechanics<br>Björn Kiefer, Stefan Prüger, Oliver Rheinbach and Friederike Röver
- Globalization of Nonlinear FETI-DP Methods<br>Stephan Köhler and Oliver Rheinbach
- ParaSiF_CF: A Partitioned Fluid-Structure Interaction Framework for Exascale<br>Wendi Liu, Alex Skillen and Charles Moulinec
- Implicitly extrapolated geometric multigrid for the gyrokinetic Poisson equation<br>Carola Kruse, Martin Kuehn, Philippe Leleux, Ulrich Ruede and Christina Schwarz
## CONFERENCE PROGRAMME & TECHNICAL SESSIONS

### 8/6/22 14:00 - 16:00

**Modelling of environment-assisted fracture II**  
Minisymposium organized by Haiyang Yu and Zhiliang Zhang

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<td><strong>Towards a better understanding of hydrogen embrittlement in austenitic steels: the role of hydrogen characteristics and fracture mechanisms</strong> (Keynote Lecture)</td>
<td>Lisa Cloys, Kim Verbeken and Tom Depover</td>
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<tr>
<td>Ductile-brittle transition in ultrahigh-strength steels – estimation &amp; application</td>
<td>Sakari Pallaspuro, Yang Li, Haiyang Yu, Zhiliang Zhang and Jukka Komi</td>
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<td>Hydrogen induced degradation in lattice material</td>
<td>Danial Molavitabrizi, Haiyang Yu and S. Mahmoud Mousavi</td>
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<td>Modelling mechanical behavior of steel in marine environment</td>
<td>Goran Vukelic, Goran Vizentin and Darko Pastoric</td>
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### 8/6/22 14:00 - 16:00

**Towards Next Generation of Industrial Aerodynamic Simulation Tools II**  
Minisymposium organized by Oriol Lehmkuhl, Eusebio Valero and Jordi Pons

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<tr>
<td><strong>Algorithmic Differentiation for an efficient CFD solver</strong></td>
<td>Bruno Maugars, Sbastien Bourrasse, Cédric Content, Bertrand Michel, Bérenger Berthoul, Jorge Nunez Ramirez, Itham Salah el Din, Pascal Raud and Laurent Hascoët</td>
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<tr>
<td>Identifying stability constraints of high-order methods on distorted meshes through a von-Neumann analysis framework</td>
<td>Saumitra Joshi, Gonzalo Rubio and Esteban Ferrer</td>
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<tr>
<td>A Machine Learning based Expert System for Optimizing CFD Solver Parameters</td>
<td>Lina El Zaatari, Tobias Leicht, Stefan Langer, Philipp Bekemeyer and Stefan Götz</td>
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<tr>
<td>On the GPU-enabling techniques for Finite Elements CFD codes</td>
<td>Lucas Gasparino, Guillaume Houzeaux, Filippo Spiga and Oriol Lehmkuhl</td>
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<tr>
<td>Aerodynamics predictions of a NACA0012 in LES simulations using a high order discontinuous Galerkin solver</td>
<td>Oscar Marino, Esteban Ferrer, Eusebio Valero and Jon Errasti</td>
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### 8/6/22 14:00 - 16:00

**Innovations in phase-field modeling, computation and Experimental Validation II**  
Minisymposium organized by Fadi Aldakheel, Yousef Heider, Thomas Wick, Roberto Alessi and WaiChing Sun

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<td><strong>Phase-field modelling of fatigue fracture in aluminium sheets</strong></td>
<td>Martha Seiler and Markus Kästner</td>
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<tr>
<td>A micromorphic phase-field model for fracture in porous media</td>
<td>Bouchra Kharrat, Fredrik Larsson and Ralf Jäncke</td>
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<tr>
<td>A spatially adaptive phase-field model for dynamic fracture</td>
<td>Dhananjay Phansalkar, Kerstin Weinberg, Michael Ortiz and Sigrid Leyendecker</td>
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<tr>
<td>Micromechanics-based variational phase-field modeling of Brazilian tests on mortar samples</td>
<td>Mina Sarem, Jacinto Ulloa, Nuhamin E. Deresse, Els Verstrynge and Stijn François</td>
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<tr>
<td>Direction-dependent orthogonal decomposition of an orthotropic constitutive model for phase field approach to fracture</td>
<td>Vahid Ziaei-Rad, Mostafa Moloooli, Thomas Nagel, Olaf Kolditz and Keita Yoshioka</td>
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### 8/6/22 14:00 - 16:00

**Advances in high-order discretisation methods and model reduction methods for CFD problems II**  
Minisymposium organized by T. Taddei and A. Ferrero

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<th>8/6/22 14:00 - 16:00</th>
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<td><strong>High-order adaptive finite elements for time-harmonic acoustics</strong> (Keynote Lecture)</td>
<td>Hadrien BERIOT and Gwenael GABARD</td>
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<tr>
<td>Analysis of high-order interpolation schemes for the finite-volume resolution of linear problems on unstructured meshes</td>
<td>Pablo Castilla, Eugenio Schillaci, Joaquim Rigola and Carlos-David Pérez-Segarra</td>
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<tr>
<td>P-adaptive LDG method applied to LES of parallel blade-vortex interaction on NACA23012 airfoil</td>
<td>Antonio Aboz</td>
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<td>Vectorial limitation for multislope MUSCL schemes</td>
<td>Arthur Tételin, Clément Le Touze and Philippe Villedieu</td>
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<tr>
<td>Discontinuous-continuous Galerkin fluid-structure interaction algorithm for elastic structures with large deformations</td>
<td>Aleš Pecka, Ondřej Bublík and Jan Vimr</td>
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### Conference Programme & Technical Sessions

#### 8/6/22 14:00 - 16:00
**Reliability analysis and rare event simulation. II**
**Minisymposium organized by Max Ehre, Iason Papaioannou, Edoardo Patelli, Daniel Straub and Bruno Sudret**
**Chair: Max Ehre**

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<td><strong>Quantization applied to the visualization of low-probability flooding events</strong> Charlie Sirg, Rodolphe Le Riche, Didier Rulliere, Jérémy Rohmer, Yann Richet and Lucie Pheulpin</td>
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<td>8/6/22 14:00 - 16:00</td>
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<td><strong>Modeling the resilience of power distribution systems against ice storms.</strong> Guangyang Hou and Murelae Mureletharan</td>
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<td>8/6/22 14:00 - 16:00</td>
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<td><strong>The effects of noise on reliability analysis</strong> Anderson Pires, Maliki Moustapha, Stefano Marelli and Bruno Sudret</td>
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<td>8/6/22 14:00 - 16:00</td>
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<tr>
<td><strong>Risk Assessment for Transpiration Cooling</strong> Ella Steins and Michael Herty</td>
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<tr>
<td><strong>System reliability assessment of an offshore wind turbine jacket by using adaptive Kriging and composite active learning approaches</strong> Chao Ren, Younes Aoues, Didier Lemosse and Eduardo Souza de Cursi</td>
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#### 8/6/22 14:00 - 16:00
**Multiphase flows with surface tension and capillarity II**
**Minisymposium organized by Julien Bruchon, Nicolas Moulin, Modesar Shakoor and Luisa Silva**
**Chair: Modesar Shakoor**

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<td><strong>Navier-Stokes Cahn-Hilliard modeling of multi-phase flow in an immersed finite element setting</strong> Stein Stoter, Tom van Sluijs and Harald van Brummelen</td>
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<td>8/6/22 14:00 - 16:00</td>
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<tr>
<td><strong>Investigation of the Navier-Stokes-Cahn-Hilliard diffuse interface model for numerical simulations of unstable liquid filaments</strong> Tom B. van Sluijs, Tristan H.B. Demont, Stein K.F. Stoter, Harald. E. van Brummelen and Herman M.A. Wijshoff</td>
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<td><strong>A unified analysis framework of Navier-Stokes Cahn-Hilliard models with different densities</strong> Marco ten Eikelder, Kris van der Zee, Ido Akkerman and Dominik Schillinger</td>
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<tr>
<td><strong>Free response of a gravitational liquid sheet by means of three-dimensional Volume-of-Fluid simulations</strong> Alessandro Della Pia, Luigi Grando, Antonio Colanera, Matteo Chiatto and Luigi de Luca</td>
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#### 8/6/22 14:00 - 16:00
**Data-driven and projection-based reduced order models for computational sciences and engineering II**
**Minisymposium organized by Gianluigi Rozza and Giovanni Stabile**
**Chair: Giovanni Stabile**
**CoChair: Gianluigi Rozza**

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<tr>
<td><strong>Preconditioned Least-Squares Petrov-Galerkin Reduced Order Models for Solid and Fluid Mechanics Problems (Keynote Lecture)</strong> P. Lindsay, J. Fike, I. Tezaur and K. Carlberg</td>
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<td>8/6/22 14:00 - 16:00</td>
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<td><strong>An Efficient Reduction Scheme for Contact Problems in Linear Elasticity</strong>安娜 Monvelten, Bernd Simeon and Utz Wever</td>
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<tr>
<td><strong>Reduced order models for the solution of geometrically-parametrized turbulent flow problems.</strong> Vassileios Tsiloklis, Trond Kvamsdal, Adil Rashid, Eivind Fonn and Harald van Brummelen</td>
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<td><strong>Finite element approximation of wave problems with correcting terms based on training artificial neural networks with fine solutions</strong> Arnau Fabra, Joan Baiges and Ramon Codina</td>
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<tr>
<td><strong>Dictionary-based approximations for reduced order models in contact mechanics</strong> Kiran S. Kollepara, Jose V. Aguado, Yves Le Guennec and Luisa Silva</td>
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#### 8/6/22 14:00 - 16:00
**Discrete conservation properties for fluid flows: from fundamentals to applications II**
**Minisymposium organized by N. Valle, F. X. Trias, F. Capuano, G. Coppola and R.W.C.P. Verstappen**
**Chair: R.W.C.P. Verstappen**

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<td><strong>Linear and quadratic invariants preserving discretization of Euler equations</strong> Gennaro Coppola and Arthur E. P. Veldman</td>
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<td><strong>High order entropy split methods employing compact central spatial discretizations</strong> Bjorn Stigards and H.C. Yee</td>
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<td><strong>An assessment of various discretizations of the energy equation in compressible flows</strong> Carlo De Michele and Gennaro Coppola</td>
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<td><strong>Variational approaches to various numerical schemes for fluid and multi-fluid flows with geometry-energy-entropy compatibility</strong> Antoine Llor</td>
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<td><strong>Energy-preserving stable computations of high-pressure supercritical fluids turbulence</strong> Marc Olle-Bernades, Francesco Capuano, F. Xavier Trias and Lluís Jofre</td>
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<td><strong>A fully-discrete entropy conserving/stable discretization for inviscid unsteady flows</strong> Alessandro Colombo, Andrea Crivellini and Alessandra Nero</td>
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**CONFERENCE PROGRAMME & TECHNICAL SESSIONS**

**8/6/22 14:00 - 16:00**

**Computational Analysis of Advanced Materials and Structures II**
Minisymposium organized by Efstathios E. Theotokoglou and Ioannis K. Giannopoulos

MS74B
Room: A1 – 4
Chair: S. Tveit
CoChair: K. Anam

- Computationally efficient simulation of low velocity impact and compression after impact response in laminated composites
  
  Khairul Anam, Melanie Todt and Heinz E. Pettermann

- Integrated deep drawing and high-cycle fatigue analysis using a continuous-time approach
  
  Sigbjørn Tveit, Aase Reyes and Ennrah Erduran

- Investigation of higher harmonic Lamb waves for facilitating delamination characterization
  
  Akhilendra Gangwar and Dhanashri M. Joglekar

- Non-deterministic characterization of the damage tolerance of metal/composite structure
  
  Stephanie TerMaath and Corey Arndt

- Influence of doping atoms on twinning stress in Ni2MnGa alloy
  
  Petr Šesták, Martin Heczko and Martin Zelený

- Quantification of geometrically non-linear cross-sectional deformations for wind turbine rotor blades
  
  Julia Gebauer and Claudio Balzani

**8/6/22 14:00 - 16:00**

**Simulation-based optimization considering dynamic systems and/or uncertainty II**
Minisymposium organized by Thomas Rung, Benedikt Kriegesmann, Kathrin Welker, Martin Siebenborn, Robert Seifried and Alexander Düste

MS34B
Room: A1 – 5
Chair: Thomas Rung
CoChair: Martin Siebenborn

- Applicability of discrete adjoints for wind comfort optimization
  
  Suneth Warnakulasuriya, Máte Péntek, Kai-Uwe Bletzinger and Roland Wüchner

- A Scalable Algorithm for Geometric Constrained Shape Optimization in Banach Spaces
  
  Peter Marvin Müller, Jose Alfonso Pinzon Escobar and Martin Siebenborn

- Sensitivity enhancement of the generalized polynomial chaos for efficient optimization under uncertainty
  
  Kyriakos Dimitrios Kontarakios and George Papaioakakis

- Learning a mesh motion technique with applications to fluid-structure interaction and shape optimization
  
  Johannes Haubner

- A fluid-structure interaction study of hemodynamics in arterial bypass-graft anastomoses
  
  Georgios Bletsos, Lars Radtke, Alexander Düste and Thomas Rung

**8/6/22 14:00 - 16:00**

**Advances on computational methods for multiphase flows with phase change III**
Minisymposium organized by Luca Brandt, Marica Pelanti and Maria Giovanna Rasio

MS22C
Room: A1 – 6
Chair: Luca Brandt

- A pressure-based method for low Mach number two-phase flows with mass transfer
  
  Andreas D. Demou, Nicolo Scapin, Marica Pelanti and Luca Brandt

- Direct numerical simulation of two-phase compressible flows with phase change
  
  Mure Ribot, AnnaFederica Urbano and Sebastien Tanguy

- A volume-of-fluid method for multicomponent evaporating two-phase flow
  
  Salar Zamani Salimi, Nicolo Scapin, Andrea Gruber and Luca Brandt

- Investigation of Interfacial Mass Transfer During Dropwise Condensation Using the Navier-Stokes-Korteweg Equations with a van der Waals Fluid
  
  Julián N. García Hahn, Carlos A. Dorao and Maria Fernandino

- Diffuse interface method for direct numerical simulation of nucleate boiling
  
  Giorgio Minozzi, Alessio Lavino, Edward Smith, Jionghui Liu, Tassos Karayiannis, Khellil Sefiane, Omar Matar, David Scott, Timm Krueger and Prashant Valluri

- Direct numerical simulation of bubble growth in a nanocavity
  
  Arnoldo Badillo, Alessio D. Lavino, Annalisa Manera, Victor Petrov, Edward Smith, Mirco Magnini and Omar K. Matar

**8/6/22 14:00 - 16:00**

**Reduced order modeling of dynamical systems through deep learning techniques II**
Minisymposium organized by Andrea Manzoni, Mengwu Guo and Paris Perdikaris

MS125B
Room: B1 – 1
Chair: Andrea Manzoni

- On the employ of inductive biases for the development of learned simulators
  
  Quercus Hernandez, Alberto Badias, Francisco Chinesta and Elias Currò

- Physics-informed neural networks as reduced simulation models for bioreactor and crystallisation modeling
  
  Daniel Wolff, Konstantin Key, Eric von Lieres and Stefanie Elgeti

- Deep-HyROMnet: a deep learning-based operator approximation for model order reduction in structural mechanics
  
  Ludovica Cicci, Stefania Fresco and Andrea Manzoni

- Active learning and time-series prediction for non-intrusive model reduction
  
  Harshit Kapadia, Lihong Feng and Peter Benner

- Machine learning accelerated dynamic analysis of stochastic nonlinear structures
  
  Stefanos Nikolopoulos, Ioannis Kalogeris and Vissarion Papadopoulos
### CONFERENCE PROGRAMME & TECHNICAL SESSIONS

**8/6/22 14:00 - 16:00**  
**Mechanics of soft, multifunctional materials: Experiment, modeling and simulation II**  
Minisymposium organized by Mokarram Hossain, Daniel Garcia-Gonzalez and Ruike Zhao

**MS82B**  
Room: B1 – 2  
Chair: Jesus Martinez-Frutoz  
CoChair: Daniel Garcia-Gonzalez

- On thermo-electro-viscoelasticity of dielectric elastomers: A comprehensive experimental study meets numerical modelling  
  Mokarram Hossain, Markus Mehnert and Paul Steinmann
- A variational-based mixed finite element formulation for liquid crystal elastomers  
  Michael Gross, Julian Dietzsch and Francesca Concasa
- Thymos - A portable open hardware testing device  
  Ian Novak, Jan Havetka and Jozef Michalek
- Taut domain analysis of transversely isotropic dielectric elastomer membranes  
  Aman Khurana, Giuseppe Zurlo and Manish M. Jaglekar
- Dynamic modeling of a soft pneumatic actuator  
  Rebecca Berthold and Stephanie Kahms
- Electro-mechanical aging of 3D printed PLA conductive composites  
  Javier Crespo, Daniel Garcia, Juan Manuel Martinez, Guillermo Robles and Angel Arias

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**8/6/22 14:00 - 16:00**  
**Emerging methods for large-scale and robust multidisciplinary optimization (MDO) for industrial applications I**  
Minisymposium organized by Jens-Dominik Mueller, Arthur Stueck and Marcus Meyer

**MS116A**  
Room: B3 + B4  
Chair: Jens-Dominik Mueller

- Multidisciplinary Design Optimization of Lifting Surfaces: State-of-the-Art and Industrial Applications (Keynote Lecture)  
  Joaquim Martins
- A framework approach integrating high-fidelity analysis methods for gradient-based design optimization of aircraft  
  Thomas Backhaus, Sebastian Gottfried, John T. Hwang, Andrei Merle and Arthur Stueck
- Challenges of integrating adjoint simulations in industrial turbomachinery mdo  
  Ian Backhaus, Christian Voß and Christian Frey
- Aerelastic Adjoint-Based Optimisation of Highly Flexible Aircraft Wing Configuration  
  Michael Meheut, Marco Carini and Christophe Blondeau
- LES-aided shape optimization of U-Bend channel  
  Russell Quadros and Jens Mueller

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**8/6/22 14:00 - 16:00**  
**Model-based approaches and data-centric models for digital manufacturing I**  
Minisymposium organized by Rekha Rao, Jeremy Lechman, Kevin Long, Scott Roberts, Elie Hachem and Patrick Anderson

**MS121A**  
Room: Jan Mayen 1  
Chair: Rekha Rao  
CoChair: Elie Hachem

- Intelligent Numerical Design of Components and their Production Processes (Keynote Lecture)  
  Stefanie Fager, Sebastian Hube, Joewook Lee and Daniel Wolff
- Anomaly Forecast of Sensor Data in Energy Intensive Industries  
  Nidhi Sawhney, Srircharan Poundariakpuram, Denis Malov and Rafael Pacheco
- Training the Layer Image Auditing System with Simulated Images in Additive Manufacturing  
  Imovo Song and Heung Soo Kim
- Multiphysics modeling of coupled chemical-thermal-mechanical phenomena in polyurethane foams during manufacturing  
  Rekha Rao, Kevin Long, Judy Brown and Christine Roberts
- Evaporative front kinetics in random 3D topologies. Application to the Lost Foam casting process  
  Cynthia Hayek, Elie Hachem and Rudy Valette

---

**8/6/22 14:00 - 16:00**  
**Computational Plasticity in Crystals and Polycrystals II**  
Minisymposium organized by Luiza Angheluta, Jorge Vinals, Marco Salvaglio and Stefanos Papanikolaou

**MS100B**  
Room: Jan Mayen 2  
Chair: Marco Salvaglio

- Multiphase-field method accounting for crystal plasticity  
  Andreas Prahs, Lukas Schöller, Daniel Schneider and Britta Nestler
- A unified non-linear energy dissipation-based plastic-damage model for cyclic loading  
  Alejandro Carnejo, Sergio Jimenez, Lucia G. Barbu, Sergio Oller and Eugenio Oñate
- Computational atomistic dislocation plasticity modelling of pristine and irradiated crystals  
  P. Javier Dominguez Gutierrez, Stefanos Papanikolaou, Pawel Sobkowicz and Mikko Alava
- The interplay of short-range order and exceptional mechanical properties in fcc VCoNi concentrated solid solutions: A combined molecular simulation study of dislocation defect dynamics and thermal aging effects  
  Amin Esfandiarpour, Rene Alvarez, Stefanos Papanikolaou and Mikko Alava
### CONFERENCE PROGRAMME & TECHNICAL SESSIONS

#### 8/6/22 14:00 - 16:00
**Multiphase Flow and non-Newtonian Fluid – Modelling and Applications II**
**Minisymposium organized by Chenfeng Li**

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<th>MS3B</th>
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<tr>
<td><strong>The X-Mesh method applied to Multiphase Flows</strong></td>
<td>Quiriny Antoine, Jean-François Remacle, Jonathan Lambrechts and Nicolas Moes</td>
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<td><strong>Multi-scale Computational Modeling of Flow of Hybrid Composites</strong></td>
<td>Nazih Assaad Al Ayoubi, Hugues Digonnet, Luisa Rocha Da Silva, Christophe Binetruy and Sebastien Comas-Cardona</td>
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<tr>
<td><strong>Non-newtonian viscous elongation and shear fluid model based on optimal triple tensor decomposition</strong></td>
<td>Markus Rütten</td>
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<tr>
<td><strong>Numerical simulation of the micro-extrusion process of printable biomaterials</strong></td>
<td>Ahmad Amani, Deniz Kizildag, Jesus Castro, Laura del Maiz, Marta Pegueroles and Maria-Pau Ginebra</td>
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<tr>
<td><strong>An efficient strategy of parcel modeling for polydisperse multiphase turbulent flows</strong></td>
<td>Linda Bahramian, Jordi Muela, Carles Oliet, C. David Pérez-Segarra and F. Xavier Trias</td>
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<td><strong>A Finite Element formulation for pyroclastic flow simulations</strong></td>
<td>Andrea Montanino, Alessandro Franci, Riccardo Rossi and Giulio Zuccaro</td>
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#### 8/6/22 14:00 - 16:00
**Deep Learning in Scientific Computing II**
**Minisymposium organized by Manuel Jesus Castro Diaz, Siddharta Mishra and David Pardo**

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<tr>
<td><strong>Geosteering using Deep Learning</strong></td>
<td>Mostafa Shahriari, David Pardo and Jon Ander Rivera</td>
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<td><strong>Learning Operators via Mesh-Informed Neural Networks</strong></td>
<td>Nicola R. Franco, Andrea Manzoni and Paolo Zunino</td>
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<tr>
<td><strong>Can deep learning diagnose neurodegenerative diseases with retinal ganglion cell layer?</strong></td>
<td>Alberto Montalvo, José Cegoñino, Elena Garcia-Martín and Amaya Pérez del Polomar</td>
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<tr>
<td><strong>Enhanced Bayesian model updating for structural health monitoring via deep learning</strong></td>
<td>Matteo Torzoni, Andrea Manzoni and Stefano Mariani</td>
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<tr>
<td><strong>Damage detection in bridge structures using an unsupervised Deep Autoencoder</strong></td>
<td>Ana Fernandez-Navamuel, Diego Zamora-Sánchez, David García-Sánchez, Filipe Magalhães and David Pardo</td>
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<tr>
<td><strong>Deep learning methods for liquid crystal driven transformation optics</strong></td>
<td>Jamie M. Taylor, Guilhem Poy, Miha Ravnik and Arghir Zarnescu</td>
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#### 8/6/22 14:00 - 16:00
**Multi-fidelity methods for uncertainty quantification and optimization II**
**Minisymposium organized by Lorenzo Tamellini, Matteo Diez, John Jakeman and Alex Gorodetsky**

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<th>Chair: Alex Gorodetsky</th>
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<tr>
<td><strong>Multifidelity uncertainty quantification for non-deterministic models</strong></td>
<td>Brian W. Reuter, Gianluca Geraci, Timothy M. Wildey and Michael S. Eldred</td>
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<tr>
<td><strong>Goal-oriented adaptive MLMC for elliptic random PDEs</strong></td>
<td>Joakim Beck, Yang Li, Erik von Schwerin and Raul Tempone</td>
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<tr>
<td><strong>Multilevel Delayed Acceptance MCMC: Cascading Distributions, Variance Reduction and Adaptive Error Models</strong></td>
<td>Mikkel B. Lykkegaard, Tim J. Dodwell, Colin Fox, Grigoris Mias and Robert Scheichl</td>
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<tr>
<td><strong>A combination technique for optimal control problems under uncertainty</strong></td>
<td>Fabio Nobile and Tommaso Vanzani</td>
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<tr>
<td><strong>Surrogates in PDE-constrained one-shot optimization under uncertainty</strong></td>
<td>Philipp A. Guth, Claudia Schillings and Simon Weissmann</td>
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<tr>
<td><strong>A CFD-based multi-fidelity surrogate model for prediction of flow parameters in a ventilated room</strong></td>
<td>Nina Morozova, F. Xavier Trias, Vladmir Vanovskiy, Carles Oliet and Eugeny Burnaev</td>
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#### 8/6/22 14:00 - 16:00
**Advances in shock capturing strategies for high order methods I**
**Minisymposium organized by Jonas Zeitfong, Deep Ray and Andrea Beck**

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<th>MS115A</th>
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<th>Chair: Andrea Beck</th>
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<tr>
<td><strong>Shock-capturing for high-order discontinuous Galerkin solvers (Keynote Lecture)</strong></td>
<td>Yu Pan, Zheng-Guo Yan, Spencer Sherwin and Joaquim Peira</td>
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<tr>
<td><strong>Data-driven shock capturing for the discontinuous Galerkin spectral element method</strong></td>
<td>Jonas Zeitfong, Andrea Beck, Anna Schwarz and Jens Reim</td>
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<tr>
<td><strong>FC-based shock-dynamics solver with neural-network localized artificial-viscosity assignment</strong></td>
<td>Oscar P. Bruna, Jon S. Hesthaven and Daniel V. Leibovici</td>
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<td><strong>Maximum-order data-driven Weighted Essentially Non-Oscillatory (WENO) schemes</strong></td>
<td>Denis A. Bezgin, Steffen J. Schmidt and Nikolaus A. Adams</td>
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<tr>
<td><strong>An extended discontinuous Galerkin method for high-order shock treatment</strong></td>
<td>Jakob Sebastian and Florian Kummer</td>
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CONFERENCE PROGRAMME & TECHNICAL SESSIONS

8/6/22  14:00 - 16:00
Structure-Preserving Finite Element Methods in Computational Fluid Dynamics II
Minisymposium organized by Philip Lederer and Christian Merdon
Chair: Philip Lederer

| MS142B | Room: O – 3
| 156 157 |

Structure-Preserving Finite Element Methods in Computational Fluid Dynamics II
Minisymposium organized by Philip Lederer and Christian Merdon
Chair: Philip Lederer

Mass Conserving Mixed Stress-Strain rate Finite Element Methods for Non-Newtonian Fluid Simulations
Jan Ellmenreich and Philip L. Lederer

Comparison of different entropy stabilization techniques for discontinuous Galerkin spectral element methods
Johannes Markert and Gregor Gassner

A really pressure-robust virtual element method for the Stokes problem
Derk Frerichs-Mihay and Christian Merdon

Performance and Scalability of the CFD Solver CODA
Michael Wagner

A variational finite element discretization for compressible fluids
François Gay-Balmaz and Evan Gawlik

A geometric finite element method for MHD that preserves energy, cross-helicity, magnetic helicity, incompressibility, and div B = 0
Evan S. Gawlik and François Gay-Balmaz

8/6/22  16:00 - 16:30
Coffee Break

16:00 - 16:30 | TECHNICAL SESSIONS

8/6/22  16:30 - 18:30
Disruptive Aircraft's Wing Configurations towards Climate Neutrality
STS06A
Room: Hedmark (GF)
Chair: Marianna Braza

Numerical simulation of a morphing wing of A320 type, through multi-parametric wobulation in the vicinity of the trailing edge in subsonic regimes
Clément Rouaix, César Jimenez-Navarro, Abderrahmane Marouf and Marianna Braza

Numerical simulation of the aerodynamic performance of a supercritical wing subjected to a hybrid electroactive morphing associating cambering and multi-parametric vibration effects
Clément Rouaix, César Jimenez-Navarro, Abderrahmane Marouf, Mateus Carvalho, Jean-François Rouchon, Yannick Hoarau, Rajaa El Akoury and Marianna Braza

Numerical simulation of the aerodynamic performance of a morphing wing in the transonic regime
César Jimenez Navarro, Clément Rouaix, Abderrahmane Marouf, Alexandre Ninet, Yannick Hoarau and Marianna Braza

Electroactive morphing effects through travelling wave actuation on the aerodynamic performance of a morphing wing by means of numerical simulation.
Abderahmane Marouf, Rajaa El Akoury, César Jimenez-Navarro, Alexandre Ninet, Yannick Hoarau and Marianna Braza

Flow analysis around a high-lift wing-flap system and application of Active Flow Control to enhance the aerodynamic performances at high Reynolds number
Yannick Hoarau, Abderrahmane Marouf, Hung D. Truong, Alain Gehri, Dominique Charbonnier and Jan B. Vos

8/6/22  14:00 - 16:00
Modeling complex fluid and solid dynamics during earthquake ruptures II
Minisymposium organized by Fabian Barras, Gaute Linga, François Renard, Omar Duran and Eirik Keilegavlen
Chair: Fabian Barras

| MS48B | Room: O – 4
| 157 |

Modeling complex fluid and solid dynamics during earthquake ruptures II
Minisymposium organized by Fabian Barras, Gaute Linga, François Renard, Omar Duran and Eirik Keilegavlen
Chair: Fabian Barras

Dynamics, radiation and overall energy budget of earthquake rupture with coseismic off-fault damage
Harsha Bhat, Kurama Okubo and Esteban Rougier

A Multibody Meshfree Approach for the simulation of gouge melting in seismic faults
Guilhem Mollon

Time and space evolution of R-bands in a dense granular material, relation to the evolution of the entire fault gouge.
Nathalie Casas, Guilhem Mollon and Ali Daouadji

Implementation of a bounding surface constitutive model for fully coupled dynamic analysis of soil and its validation using dynamic triaxial test
Junxiang Wang, Giovanna Xotta, Nico De Marchi and Valentina Salomoni

Mixed-dimensional hydromechanical modelling of an in situ hydroshearing experiment
Ivar Stefansson, Haakon L. L. Ervik, Mohammadreza Jalali, Antonio P. Rinaldi, Thomas Driesner and Inga Berre

A fully implicit collocated finite volume scheme for modelling induced seismicity
Aleksei Novikov, Denis Vasov, Hadi Hajiheydari and Jan Dirk Jansen
Confidence Programme & Technical Sessions

8/6/22 16:30 - 18:30
Bayesian inference of engineering models: advances in theory and applications II
Minisymposium organized by Oindrila Kanjilal, Iason Papaioannou, Daniel Straub, Geert Lombaert and Costas Papadimitriou
Chair: Kostas Papakonstantinou

- Certified Dimension Reduction for Bayesian Updating with the Cross-Entropy Method
  Max Ehre, Rafael Flock, Iason Papaioannou and Daniel Straub

- Multilevel Markov chain Monte Carlo methods for Bayesian full-field data assimilation with application to structural health monitoring
  Pieter Vannechelen, Geert Lombaert and Giovanni Samarey

- Bayesian Optimal Sensor Placement for Virtual Sensing and Strain Reconstruction
  Tulay Erçan, Omid Sedehi, Costas Papadimitriou and Lambros Katafygiots

- Greedy sensor placement for Bayesian inverse problems via model order reduction
  Nicole Aretz, Nada Cveticovic, Francesco Silva and Karen Veray

- Variational Bayesian Approximation of Inverse Problems using Sparse Precision Matrices
  Jan Povala, Ieva Kazlauskaite, Eky Febrianto, Fehmi Cirak and Mark Girolami

- Scalable statistical finite elements via partial differential equation representation of Matérn fields
  Kim Jie Koh, Eky Febrianto and Fehmi Cirak

8/6/22 16:30 - 18:30
Fluid-Structure Interaction and Structural Health Monitoring of Offshore Structures and Mechanical Systems
Minisymposium organized by Dimitrios Pavlou, George Lampeas, Pantelis Nikolakopoulos and Sudath Siriwadana
Chair: Dimitrios Pavlou
CoChair: Sudath Siriwadana

- Fluid-structure interaction problem of two coaxial vibrating flexible cylinders separated by a thin layer of fluid
  Maria Adela Puscas and Romain Lagrange

- Wave based method for 2D Unsaturated elastodynamic soil under Harmonic Loading
  Miriam Lainer and Gerhard Müller

- Dynamic Response of Offshore Wind Turbines under Nonlinear Irregular Ocean Waves
  Hadi Pezeshki, Dimitrios Pavlou and Sudath C. Siriwadana

- A weak coupled model for the fluid-structure interactions on a cross-flow tidal turbine model
  Timo Bennecke, Karla Ruiz Hussmann, Paul Joedecke, Christian-Toralf Weber, Pierre-Luc Delafín, Cyrille Bonamy and Stefan Hoerner

- Uncertainties of Parameters Quantification in SHM
  Mohammad S. Miah and Werner Lienhart

- Inner flow-induced buckling of offshore pipelines
  Dimitrios Pavlou

- S-N-based Fatigue Damage Modelling of Offshore Structures
  Fredrik Bjørheim, Sudath C. Siriwadana and Dimitrios Pavlou
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<td>8/6/22</td>
<td>16:30 - 18:30</td>
<td><strong>Data-driven numerical and reduced order modeling of flows III</strong></td>
<td>MS19C, Oslo 2 (GF)</td>
<td>Nikolaus Adams and Jörg Schumacher</td>
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<td>Active flow control on airfoils through deep reinforcement learning</td>
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<td>Pol Suarez, Pau Varela, Juan Echevarria, Jean Rabault, Maxence Deferre, Bernat Font, Luis Miguel Garcia-Cuevas, Arnau Miró, Andréis Tiseira, Oriol Lehmkühl and Ricardo Vinuesa</td>
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<td>Data-Driven Surrogate Modelling of Aerodynamic Forces on the Superstructure of Container Vessels</td>
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<td>Rupert Pavhe and Thomas Rung</td>
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<td>Deep-learning based aeroelastic modeling for transient flows and non-linear dynamics</td>
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<td>Maxime Casanova, Taraneh Sayad and Jean-Camille Chassaing</td>
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<td>Surrogate modeling of unsteady aerodynamic loads acting on a plunging airfoil</td>
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<td>Rahul Sundar, Virendra Kumar, Dhananjay Phansalkar, Pietro Carrara, Sigrid Leyendecker, Julia Mergheim, Laura De Lorenzo and Pascale Canestraro</td>
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<td>Wind flow field predictions over high-rise buildings using machine learning framework</td>
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<td>Onkar Jadhav, Anina Glumac and Stephane Bordas</td>
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<td>Efficient data-driven control of fluids using autonomous surrogate models</td>
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<td>Sebastian Peitz and Katharina Bleker</td>
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<td>JWC</td>
<td>JWC, Akershus (1F)</td>
<td>Enrique Nadal Soriano</td>
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<td>16:30 - 18:30</td>
<td><strong>EYIC Junior Workshop III (limited to 100 pre-registered participants)</strong></td>
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<td>Data-driven fracture mechanics</td>
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<td>Pietro Carrara</td>
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<td><strong>Recent developments and current issues in the phase-field modeling of fracture III</strong></td>
<td>MS67C, Romerike (GF)</td>
<td>Patrick Kurzeja</td>
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<td>Dynamic phase-field fracture with a first-order discontinuous Galerkin method for elastic waves (Keynote Lecture)</td>
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<td>Christian Wiemers and Kerstin Weinberg</td>
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<td>Phase field model for simulating fracture of ice</td>
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<td>Rabea Sondershaus and Ralf Müller</td>
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<td>A unified phase-field model of fracture in rate-dependent materials</td>
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<td>Franz Dammasso, Maredy Ambati and Markus Kastner</td>
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<td>Phase-field modeling of large strain ductile fracture: an AT1 effective stress approach</td>
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<td>Alessandro Marengo and Umberto Peregio</td>
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<td>A numerical framework for the electro-mechanical analysis of conductive tracks in printed electronics</td>
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<td>Brit Cordewener, Jeroen Knippenberg, Marc Geers and Joris Remmers</td>
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<td>8/6/22</td>
<td>16:30 - 18:30</td>
<td><strong>Advanced Modelling Procedures for Masonry Structures III</strong></td>
<td>MS71C, Sør – Norge (GF)</td>
<td>Daniela Addessi</td>
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<td>Nonlinear macroelement based on Bouc-Wen formulation with degradation for the equivalent frame modeling of masonry walls</td>
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<td>Domenico Liberatore, Daniela Addessi and Alessandra Paoloni</td>
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<td>Multiscale finite element modeling linking shell elements to 3D continuum</td>
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<td>Daniela Addessi, Paolo Di Re, Cristina Gatta and Elio Sacco</td>
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<td>Rocking Analysis for the bell tower of Sant’anna in Cervino</td>
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<td>Antonio Gesualdo and Mariateresa Guadagnuolo</td>
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<td>3D energy-based detection of settlement induced mechanisms for masonry-like structures</td>
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<td>Antonio Iannuzzo, Francesco Ranaldo, Tom Van Mele, Antonio Gesualdo and Philippe Block</td>
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<td>Climate-based and response-based indices for the assessment of frost damage on historic brick walls in Tønsberg, Norway</td>
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<td>Petros Choidis and Dimitrios Kraniotis</td>
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**CONFERENCE PROGRAMME & TECHNICAL SESSIONS**

**8/6/22 16:30 - 18:30**

**Recent Trends in Scientific Computing for Computational Fluid Dynamics and Solid Mechanics III**

Minisymposium organized by Stefan Turek, Axel Klawonn and Uli Rüde

Chair: Stefan Turek

- A cross-platform, high-performance SPH toolkit for image-based flow simulations on the pore scale of porous media
  Dominik Goedeke, David Krach, Daniel Rostan, Malte Schirrwon and Holger Steeb

- Vectorised spectral/hp element matrix-free operator for anisotropic heat transport in tokamak edge plasma
  Bin Liu, Chris Cantwell, David Moxey, Mostly Green and Spencer Sherwin

- The neural network multigrid solver for the Navier-Stokes equations and its application to 3D simulation
  Nils Margenberg, Christian Lessig and Thomas Richter

- Physically-Guided Neural Networks with Internal Variables in solid mechanics: fast predictions and constitutive equations discovery
  Jacobo Ayensa-Jiménez, Mohamed H. Doweidar, Manuel Doblaré, Javier Drera and Álvaro Ruiz del Tiempo

- Performance Portability in the Extreme-scale Scientific Software Development Kit
  Ulrike Meier Yang

- Evaluation of the performance portability layer of different linear solver packages with ALIEN, an open generic and extensible linear algebra framework
  Jean-Marc Gratien, Cédric Chevalier, Thomas Guignon, Xavier Tunc, Pascal Have and Stéphane De Chaisemartin

- Numerical Solution of 3D Diffusion Equations Via a Non-Linear Flux Limited Splitting Using the Multipoint Flux Approximation Method with a Diamond Stencil Satisfying the Discrete Maximum Principle

**8/6/22 16:30 - 18:30**

**Computational Mechanics in high strain rate and impact dynamics**

Minisymposium organized by Patrice Longère and Eric Deletambe

Chair: Patrice Longère

- Numerical Simulation of Crack Arrest in Impact Loaded Shock-Resistant PMMA using SPH
  Kean Sheng Tan, Patrice Longère and Norazrina Mat Jali

- Stochastic Simulation of the Head Impact on Windscreens
  Christopher Brakmann, Christian Alter and Stefan Kolling

- New predictive models for ballistic limit of spacecraft honeycomb-core sandwich panels subjected to hypervelocity impact
  Riley Carriere and Aleksandr Cherniakov

- Analytical modeling of shock wave stresses and spall caused by laser plasma in a material interface – application to paint stripping on aluminum substrates
  Kosmas Papadopoulos and Konstantinos Tserpes

- Large Deformation Plasticity in Reproducing Kernel Particle Method penetration into soil
  Craig Foster, Sheng-Wei Chi, Mohammad Atif and Milad Parvaneh

- Strain rate dependent material model for dynamic damage evolution in unidirectional composites
  Vivekendra Singh, Robin Olsson, Erik Marklund and Ragnar Larsson

- Reduced arlequin coupling operators for solution of localized-HF multiscale dynamic problems
  Hochmi Ben Djia and Khalil Abben

**8/6/22 16:30 - 18:30**

**Towards Next Generation of Industrial Aerodynamic Simulation Tools III**

Minisymposium organized by Oriol Lehmkuhl, Eusebio Valero and Jordi Pons

Chair: Oriol Lehmkuhl

- Turbulence models assessment using finite-volume and high-order methods for aeronautical applications
  Bernat Font, Fabio Naddeo and Oriol Lehmkuhl

- On highly scalable 2-level-parallel unstructured CFD
  Jens Jaegerskuepper

- Efficient time marching methodologies for a p-adaptive discontinuous Galerkin approximation
  Gerapimos Ntoskas, Wojciech Lasowski, Gonzalo Rubio and Esteban Ferrer

- A multigrid immersed boundary method for the CFD solver Horses3D
  Stefano Colombo, Esteban Ferrer and Eusebio Valero

- Exploring new models for Explicit Algebraic Reynolds Stress Modelling using Multi-Expression Programming
  Arnau Miro, Dirk Wunsh, Stefan Wallin and Oriol Lehmkuhl

- Analysis of the effect of holes on the heat transfer analysis of gas turbine blade cooling using CFD
  Eshwar Ramasetti and Volker Mehrmann
### Conference Programme & Technical Sessions

#### 8/6/22 16:30 - 18:30
**Innovations in phase-field modeling, computation and Experimental Validation III**

- **Minisymposium organized by FADI Aldakheel, Yousef Heider, Thomas Wick, Roberto Alessi and WaiChing Sun**

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<td>Innovations in phase-field modeling, computation and Experimental Validation III</td>
<td>Hordaland 2 (1F)</td>
<td>Fadi Aldakheel</td>
<td>Yousef Heider</td>
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- **Numerical study of finite element based micromagnetic phase-field simulations of heterogeneous microstructures**
  - Maximilian Reiche and Jörg Schröder

- **Phase-field modelling of evolving adhesive interfaces**
  - Anne M. Bosshman, Bindi S. Brook, Matteo Isardi and Kristoffer G. von der Zee

- **Modelling ductile fracture by the phase-field approach under consideration of isotropic hardening**
  - Anne-Sophie Sur, Odd Sture Hopperstad and David Morin

- **Generalized gradient flow structure of the Cahn-Hilliard-Biot model**
  - Erlend Storvik, Jakub W. Both, Jan M. Nordbotten and Florin A. Radu

- **From freezing-induced to injection-induced non-isothermal saturated porous media fracture**
  - Yousef Heider

- **Phase-Field Fracture Models for Polymer Nano-Composites**
  - Paras Kumar and Julia Mergheim

#### 8/6/22 16:30 - 18:30
**Data-driven methods in computational fluid dynamics**

- **Minisymposium organized by Celio Fernandes**

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<th>Time</th>
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<td>16:30 - 18:30</td>
<td>Data-driven methods in computational fluid dynamics</td>
<td>Oppland (1F)</td>
<td>Celio Fernandes</td>
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- **SPDE-Net: Neural Network based prediction of stabilization parameter for SUPG technique**
  - Sangeeta Yadav and Sashikumaar Ganesan

- **Tabulation of thermochemical states in reactive flows via machine learning algorithms**
  - Xi Chen, Cédric Mehl, Thibault Faney and Florent Di Meglio

- **Comparative analysis of machine learning methods for active flow control**
  - Fabio Pino, Lorenzo Schena, Ijean Rabault, Alexander Kuhnle and Miguel Alfonso Mendez

- **Fast, data-assisted simulations of multi-scale flows based on extrapolated time series**
  - Thomas Lichtenegger, Sanaz Abbasi and Stefan Pirker

- **Determination of distinct dynamical process in the flow using machine learning**
  - Serena Costanzo, Taraneeh Sayadi, Miguel Fosas de Panda, Peter Schmid and Pascal Frey

### 8/6/22 16:30 - 18:30
**Vem in Engineering Science**

- **Minisymposium organized by Fadi Aldakheel and Peter Wriggers**

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<td>16:30 - 18:30</td>
<td>Vem in Engineering Science</td>
<td>Vestfold (1F)</td>
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- **Modeling of flexible particles with the Virtual Element Method**
  - Alfredo Gay Neto, Blaž Hudobivnik, Tiago Fernandes Moherdaui and Peter Wriggers

- **2D cohesive fracture evolution within virtual element formulation**
  - Sonia Marfas, Elisabetta Monaldo and Elio Sacco

- **Computational Crystal Plasticity based on the Virtual Element Method**
  - Fadi Aldakheel, Christoph Böhm, Blaž Hudobivnik and Peter Wriggers

- **Adaptive mesh refinement procedures for the virtual element method**
  - Daniel van Huyssteen, Felipe Lopez Rivarola, Guillermo Etse and Paul Steinmann

- **Hybridization of the virtual element method for linear elasticity problems**
  - Franco Dassi, Carlo Lovadina and Michele Visinoni

- **A Virtual Element Method for 3D Contact**
  - Mertcan Cihan, Blaž Hudobivnik and Peter Wriggers

- **Coupled problems at dissipative microstructures: Modelling and computational homogenization via the Virtual Element Method**
  - Christoph Böhm, Blaž Hudobivnik, Fadi Aldakheel, Marc-André Keip and Peter Wriggers
### 8/6/22 16:30 - 18:30
**Multiphase flows with surface tension and capillarity III**  
Minisymposium organized by Julien Bruchon, Nicolas Moulin, Modesar Shakoor and Luisa Silva  
**Room: A1 – 1**  
**Chair: Luisa Silva**

- An implicit-explicit lagrange projection splitting scheme with capillarity effects and wetting  
  Lucas Tallois, Simon Peluchon and Philippe Villedieu
- Simulation of Coated Bubbles in Cavitation  
  Ahmed Basil KOTTILINGAL and Stephane Zaleski
- Effect of surfactants on the flow dynamics of liquid drops in complex microchannel geometries  
  Paula Pico, Lyes Kahouadji and Omar K. Matar
- The impact of slip for regime transitions in capillary rise  
  Surai Rishu, El Assad Ouro-Koura, Joël De Coninck, Dieter Bothe and Mathis Frick
- Statistical upscaling from numerical simulations of transient two-phase flow within random fibrous media  
  Aubin Geoffre, Nicolas Moulin, Sylvain Drapier and Julien Bruchon
- Numerical study of droplet behaviour in complex flow conditions using an optimised feedback deceleration technique (FDT)  
  Veronika Krämer, Martin Rohde, Sebastian Burgmann, Simon Rentschler, Christopher Holzknecht, Christoph Gmelin and Uwe Janoske
- Capillary Droplet Breakup and the Influence of Wetting  
  Patrick Giefer and Udo Fritsching

### 8/6/22 16:30 - 18:30
**Data-driven and projection-based reduced order models for computational sciences and engineering III**  
Minisymposium organized by Gianluigi Rozza and Giovanni Stabile  
**Room: A1 – 2**  
**Chair: Gianluigi Rozza**  
**CoChair: Giovanni Stabile**

- Model order reduction for high dimensional parametric systems  
  Manisha Chetry and Domenico Borzacchiello
- Interpolated models for non-intrusive affinization of reduced basis methods  
  Eivind Fonn, Harald van Brummelen, Jens Eftang, Trond Kvamsdal and Adil Rasheed
- Reduced order source model for railway induced vibration based on the Proper Generalized Decomposition  
  Geertrui Herremans, Stijn François and Geert Debrabrande
- Computing Green’s functions in two-dimensional wave propagation using Proper Generalized Decomposition  
  Thomas Alexiou, Pieter Reumers, Geert Debrabrande and Stijn François
- Extending the capabilities of data-driven reduced-order models to make predictions for unseen scenarios  
  Claire E. Heaney, Xiangqi Liu, Hanna Go, Zef Wolfs, Pablo Salinas, I. Michael Navon and Christopher C. Pain
- A strategy to optimal block-incremental singular value decomposition for unsteady high-fidelity simulation data  
  Xiaodong Li, Steven Hulshoff and Stefan Hickel
CONFERENCE PROGRAMME & TECHNICAL SESSIONS

8/6/22  16:30 - 18:30
Discrete conservation properties for fluid flows: from fundamentals to applications II
Minisymposium organized by N. Valle, F. X. Trias, F. Capuano, G. Coppola and R.W.C.P. Verstappen
Chair: F. Capuano

- DNS and LES on unstructured grids: playing with matrices to preserve symmetries using a minimal set of algebraic kernels
  F.X. Trias, Xavier Álvarez-Farré, Àdel Aisalti-Baldellou, Andrey Gorobets and Assensi Oliva

- Casimir preserving numerical simulation of 2d homogeneous turbulence
  Paolo Cifani, Sagi R. Ephrati, Erwin Luesink, Annout D. Franken and Bernard J. Geurts

- Comparative Study on a Variety of Structure-Preserving High Order Spatial Discretizations with Entropy Split Methods for MHD
  HC Yee

- Symmetry-preserving discretisation methods for magnetohydrodynamics
  Jannes Hopman, Xavier Trias and Joaquim Rigola

- Nonlinear stability with the energy method: shallow water models and beyond
  Tomas Lundquist, Andrew R. Winters and Jan Nordström

- Energy-conserving discretization of the pressure-free two-fluid model for one-dimensional flow in ducts
  Jurrian Bust, Benjamin Sanderse, Svetlana Dubinkina, Ruud Henkes and Cornelis Oosterlee

- On the conservation of primary and secondary properties in the simulation of multiphase flows
  Nicolas Valle, Francesc X. Trias and Roel Verstappen

8/6/22  16:30 - 18:30
Computational Analysis of Advanced Materials and Structures III
Minisymposium organized by Efstathios E. Theotokoglou and Ioannis K. Giannopoulos
Chair: I. Guz
CoChair: C. Espinosa

- Coupled thermomechanical analysis of thermoplastic composite pipe by FEM simulations (Keynote Lecture)
  Igor Guz, James Hastie and Maria Kashtalyan

- A material interpolation technique using the simplex polytope
  Konstantinos I. Vasilis, Matthias G.R. Faes, Jan Ivens and David Moens

- Simulating a laser induced shock wave to help understanding direct damage of aeronautic composite structures under lightning strikes
  Christine Espinosa, Audrey Bigond, Michel Boustie, Jean-Marc Bauchière and Didier Zagouri

- Nonlinear Behavior of Laminated Glass Plates with Hinged-Free Boundary Conditions
  Deniz Can Elci, Ebru Dural and Mehmet Zuflu Aşık

- A computational study of the prestress state caused by activated shape memory fibers in ultra high performance concrete
  Stefan Descher, Sebastian Wolf, Alexander Wetzel, Philipp Krooß and Detlef Kühl

- Closed - form expressions for the optimum winding angles of fibres in laminated pressure vessels subjected to internal pressure and axial force
  Husain J. Al-Gahtani

8/6/22  16:30 - 18:30
Simulation-based optimization considering dynamic systems and/or uncertainty III
Minisymposium organized by Thomas Rung, Benedikt Kriegesmann, Kathrin Welker, Martin Siebenborn, Robert Seifried and Alexander Düster
Chair: Benedikt Kriegesmann
CoChair: Lars Radtke

- Topology and shape optimization for transient vibroacoustic problems
  Niels Aage

- Robust Topology Optimization using Reciprocal First-Order Approximations
  Micah Kranz, Julian K. Lüdeker and Benedikt Kriegesmann

- Topology Optimization using the Discrete Element Method
  Connor O'Shaughnessy and Enrico Masoero

- Robust design optimization of a discharging hopper with DEM-based and experiment-based metamodels
  Marc P. Fransen, Matthijs Langelaar and Dingena L. Schott

- Multi-shape optimization for fluid mechanics under uncertainties
  Caroline Geiersbach, Tim Suchan and Kathrin Welker

- Robust Topology Optimization of Static Systems with Unilateral Frictional Contact
  Tina Schmidt, Benedikt Kriegesmann and Robert Seifried
CONFERENCE PROGRAMME & TECHNICAL SESSIONS

**8/6/22 16:30 - 18:30**

**Simulation-based optimization considering dynamic systems and/or uncertainty III**  
Minisymposium organized by Thomas Rung, Benedikt Kriegesmann, Kathrin Welker, Martin Siebenborn, Robert Seifried and Alexander Duester  
MS34C  
Room: A1 – 5  
Chair: Benedikt Kriegesmann  
CoChair: Lars Radtke

- Topology and shape optimization for transient vibroacoustic problems  
  *Niek Aage*
- Robust Topology Optimization using Reciprocal First-Order Approximations  
  *Micah Krenz, Julia K. Ludeker and Benedikt Kriegesmann*
- Topology Optimization using the Discrete Element Method  
  *Connor O'Shaughnessy and Enrico Masoero*
- Robust design optimization of a discharging hopper with DEM-based and experiment-based metamodels  
  *Marc P. Fransen, Matthijs Langelaar and Dingena L. Schott*
- Multi-shape optimization for fluid mechanics under uncertainties  
  *Caroline Geiersbach, Tim Suchan and Kathrin Welker*
- Robust Topology Optimization of Static Systems with Unilateral Frictional Contact  
  *Timo Schmidt, Benedikt Kriegesmann and Robert Seifried*

**8/6/22 16:30 - 18:30**

**New Challenges in Instabilities of Structures and Soft Materials**  
Minisymposium organized by ZAHROUNI Hamid, LIMAM Ali and XIU Fan  
MS77A  
Room: A1 – 6  
Chair: Hamid Zahrouni

- Immersed Boundary Analysis of Models with Internal State Variables: Applications to Hydrogels  
  *Jorge Luis Barrera Cruz and Kurt K. Maute*
- The effect of additional masses on the dynamic buckling of a like-beam structure  
  *Amine ALAOUI-TAHIRI, Claude Stolz, Mathieu Corus and Pierre Badel*
- Computational modeling of fingering in stretched hydrogel cylinders  
  *Daniel Pickard, Adam Siewiak, Anwar Koskohli, Bianco Giovanni and Basil Radovitzky*
- Study on the strength of thin perforated plate on dimple supports subject to high-pressure loadings  
  *Meisam Mohmmadi Amin and Ulrich Kruehne*
- BUCKLING OF METALLIC CYLINDRICAL SHELLS UNDER LATERAL LOADING INDUCED BY AN EXTERNAL SOLID MEDIUM  
  *Ali Limam, Hamid Zahrouni, Tan Trung BUI and Frederic Bumbie*

**8/6/22 16:30 - 18:30**

**Atomization and fragmentation of fluids**  
Minisymposium organized by Stéphane Zaleski, Leonardo Chirco, Shi Ji Chen, Junji Shinjo and Gerton Tryggvason  
MS35A  
Room: B1 – 1  
Chair: Stepheane Zaleski

- Surfactant-induced Marangoni effects in turbulent jets  
  *Lyes Mokrani, Cristian Constante-Amores and Omar Matar*
- Manifold death: the implementation of controlled topological changes in thin sheets by the signature method  
  *Leonardo Chirco, Jacob Maarek, Stephane Popinet and Stephane Zaleski*
- Direct Numerical Simulations of fuel secondary atomization  
  *Cesar Paietti, Leonardo Chirco, Santiago Marquez Damian, Norberto Nigro and Stephane Zaleski*
- Numerical simulation of spinning disc atomization  
  *Yuli Shikhmurzaev, Grigorii Sioev and Yuan Li*
- Large Eddy Simulation of Primary Breakup Processes in Dual Fuel Internal Combustion Engines Using a Fully Compressible Multicomponent Approach  
  *Yu Jiao, Steffen J. Schmidt and Nikolaus A. Adams*
- Numerical and optical investigation of flash boiling of highly volatile e-fuel microdroplets in a monodisperse stream  
  *Avijit Saha, Leif Schumacher, Peter Augustin, Abhishek Y. Deshmukh, Manuel A. Reddemann, Reinhold Kneer and Heinz Pitsch*

**8/6/22 16:30 - 18:30**

**Mechanics of soft, multifunctional materials: Experiment, modeling and simulation III**  
Minisymposium organized by Mokarram Hossain, Daniel Garcia-Gonzalez and Ruike Zhao  
MS82C  
Room: B1 – 2  
Chair: Mokarram Hossain  
CoChair: Sushma Santapuri

- Intelligent system based on magnetorheological elastomers to stimulate biological materials  
  (Keynote Lecture)  
  *Miguel Angel Moreno-Mateos, Jorge Gonzalez-Rico, Emanuel Nunez-Sardinio, Clara Gomez-Cruz, Maria Luisa Lopez-Donaire, Sergio Lucchini, Angel Arias, Arriate Muñoz-Barrutia, Diego Velasco and Daniel Garcia-Gonzalez*
- On the formulation and computational implementation of polyconvex electro-mechanics: phenomenologically invariant-based approaches and homogenised rank-n models  
  *Antonio Gil, Rogelio Ortigosa, Jesus Martinez-Frutos, Martin Horak and Martin Kruzik*
- Topology optimisation of robust flexible flexoelectric energy harvesters at finite strains  
  *Rogelio Ortigosa, Jesus Martinez-Frutos and Antonio J. Gil*
- Programming shape-morphing of dielectric elastomers through Multifunctional Topology Optimization (MFTO)  
  *Jesús Martínez-Frutos, Rogelio Ortigosa and Antonio J. Gil*
- Computational modeling of responsive nematic elastomers  
  *Roberto Brihierri and Mattia P. Cosma*
### Emerging methods for large-scale and robust multidisciplinary optimization (MDO) for industrial applications II

**Minisymposium organized by Jens-Dominik Mueller, Arthur Stueck and Marcus Meyer**

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- Extension of the GEMSEO MDO library to a MPI parallel coupled adjoint capability  
  - Jean-Christoph Giret, François Gallard and Marco Cisternino

- The impact of tube corrugation within the multi-disciplinary design optimization of a charge air cooler  
  - Atul Singh, David Tool, Edward Richardson, Claus Ibsen, Kevin Jose and Atul Bhaskar

- Shape Signature Subspace: A shapewise-supervised dimension-reduction approach for shape optimisation  
  - Shahroz Khan, Panagiotis Kaklis, Andrea Serani, Matteo Diez and Konstantinos Kostas

- Large-scale Topology Optimization on a desktop using the GPU  
  - Erik A. Träff, Niels Aage and Ole Sigmund

- Data-fitted constraint aggregation schemes  
  - Olaf Ambrozkiewicz and Benedikt Kriegesmann

- Quasi-static sizing optimization for stability of stiffened shell structures under manufacturing uncertainty  
  - Kai Steltner, Benedikt Kriegesmann and Claus Pedersen

### Model-based approaches and data-centric models for digital manufacturing II

**Minisymposium organized by Rekha Rao, Jeremy Lechman, Kevin Long, Scott Roberts, Elie Hackem and Patrick Anderson**

| Room: Jan Mayen 1 | Chair: Jan Mayen 1  
|-------------------|------------------|

- The conforming transient h-r unstructured adaptive mesh refinement (cThruAMR) method for multiphysics simulations of manufacturing processes  
  - David R. Noble

- A real-time variational data assimilation method with hybrid modelling: Application to additive manufacturing  
  - Willy Haik, Yvon Moaday and Ludovic Chamoin

- Data-driven analysis of failure mechanisms in FDM printed parts  
  - Janis Remmers, Sifra Kramer, Luc van de Plas and Hans Gommans

- Modeling Influences of Printing Defects on Mechanical Properties of Additively Manufactured Silicone Structures  
  - Craig M. Hamel, Kevin N. Long, Devin Roach and Adam W. Cook

- Simulation of the direct ink write process using finite elements and cThruAMR  
  - Alex Kurala, Rekha Rao and Anne Grillet

- Crystallization modeling for polymer injection molding in a space-time framework  
  - Blanca Ferrer Fabon, Linda Gesenhues and Marek Behr

- Studying fracture and yield surfaces of granular systems using mesoscale particle-based models  
  - Joel Clemmer, Dan Bolintineanu, Judith Brown and Jeremy Lechman

### Computational Plasticity in Crystals and Polycrystals III

**Minisymposium organized by Luiza Angheluta, Jorge Vinals, Marco Salvadoglio and Stefanos Papanikolaou**

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- Solute Strengthening Mechanisms in Concentrated SolidSolutions: Role of Short Range Order  
  - Kamran Karimi and Stefanos Papanikolaou

- We present a data-driven surrogate model for the plasticity of pure Mg  
  - Yannick Hollenweger and Burigede Liu

- On the interaction of dislocations with phase boundaries: theory and modeling with the phase field method  
  - Michael Budnitzki and Stefan Sandfeld

- Crystal plasticity modeling of cast irons  
  - Vratcheslav Balabanov, Matti Lindroos, Tom Andersson and Anssi Laukkanen
**CONFERENCE PROGRAMME & TECHNICAL SESSIONS**

### 8/6/22 16:30 - 18:30

**Multiphase Flow and non-Newtonian Fluid – Modelling and Applications III**  
Minisymposium organized by Chenfeng Li

- Numerical simulation of multiphase flows with incompressible viscoelastic flows and elastic solids  
  Alexandre Caboussat
- Numerical modeling of a high-speed wedge entry in aerated water  
  Martin van der Eijk and Peter R. Welling
- Dispersion of Viscoelastic Fluids in Porous Structures: An Experimental and Computational Investigation  
  Apostolos Kyriakou and Udo Fritsching
- Numerical Modelling of Landslide-Generated Waves  
  Alessandro Franci, Massimiliano Cremonesi, Umberto Pergo, Giovanni Crosta, Miguel Masó, Ignasi De Pouplana and Eugenio Oñate
- Geometry Influence of Particles Depositing in Realistic Human Lung Replicas  
  Jana Wedel, Mitja Strakl, Jure Ravnik, Matjaz Hribaršek and Paul Steinmann

### 8/6/22 16:30 - 18:30

**Deep Learning in Scientific Computing III**  
Minisymposium organized by Manuel Jesus Castro Diaz, Siddharta Mishra and David Pardo

- A machine learning minimal residual method for solving quantities of interest of parametric PDEs  
  Ignacio Brevis, Ignacio Muga, David Pardo, Oscar Rodríguez and Kristoffer G. van der Zee
- Using Graph Neural Network for gas-liquid interface reconstruction in Volume Of Fluid methods  
  Michele-Alessandro BUCCI, Jean-Marc GRATIEN, Thibault FANEY and Tamon NAKANO
- Long-time prediction of nonlinear parametrized dynamical systems by deep learning-based reduced order models  
  Federico Fatone, Stefania Fresca and Andrea Manzoni
- Parameter estimation for differential problems through multi-fidelity physics-informed neural networks  
  Francesco Regazzoni, Stefano Pagani, Alessandro Lombardi and Alfio Quarteroni
- A collocation method based on single-layer feedforward neural network for the resolution of Elliptic PDEs  
  Francesco Calabrò
- A Physics-Informed Deep Learning approach to computing solutions of hyperbolic problems  
  Rafael Carneiro, João Florindo and Eduardo Abreu
- A novel Machine Learning method for accurate and real-time numerical simulations of cardiac electromechanics  
  Luca Dele, Francesco Regazzoni, Matteo Salvador and Alfio Quarteroni

### 8/6/22 16:30 - 18:30

**Dakota Software for Optimization, Uncertainty Quantification and Model Calibration**  
Minisymposium organized by D. Thomas Seidel, Brian M. Adams, J. Adam Stephens and Gianluca Geraci

- Overview of the latest features and capabilities in the Dakota software  
  J. Adam Stephens, D. Thomas Seidel, Brian M. Adams and Gianluca Geraci
- Hybrid physics-based, data-driven surrogate modeling for digital twins  
  Karthik Duraisamy and Jasmin Lim
- Elastic Model Calibration using Dakota  
  J. Derek Tucker, Michael S. Eldred and Devin Francom
- Uncertainty quantification of the multiphase Discrete Element Model at novel test-rig using in-house algorithms  
  Marcin Nowak, Agata Widuch, Dawid Sukiennik, Kari Myöhänen, Markku Nikku, Alessandro Parente and Wojciech Adamczyk
- Model tuning for multifidelity sampling in Dakota  
  Michael Eldred, Gianluca Geraci, Bryan Reuter, Teresa Portone, John Jakeman and Alex Gorodetsky
- Multifidelity UQ workflows with Dakota’s graphical user interface  
  Gianluca Geraci, Elliot M. Riddway, Brian M. Adams, Bryan W. Reuter and Michael S. Eldred
- Multilevel Monte Carlo derivative-free optimization under uncertainty of wind power plants  
  Friedrich Menhorn, Gianluca Geraci, D. Thomas Seidl, Ryan King, Michael Eldred, Hans-Joachim Bungartz and Youssef Marzouk

### 8/6/22 16:30 - 18:30

**Advances in shock capturing strategies for high order methods II**  
Minisymposium organized by Jonas Ziefang, Deep Ray and Andrea Beck

- A Unified Framework to Construct Robust High-Order Discontinuous Galerkin Schemes (Keynote Lecture)  
  Andrés M. Rueda-Ramirez, Will Pazner and Gregor J. Gassner
- Positivity-preserving entropy-based adaptive filtering for discontinuous spectral element methods  
  Tanik Dzanic and Freddie Witherden
- Hybridisation of Discontinuous Galerkin methods for shock capturing in scale resolving simulations  
  Amaury Biloga, Nayan Levaux, Vincent E. Terrapon and Roel Hillewaert
  Dean Yuan, Panagiota Tsoutsanis and Karl W. Jenkins
- Adaptive Stabilized Finite Elements for Compressible Flows  
  Thibaut Devos, Aurélien Larcher, Francesco Delloro and Elie Hochem
### Modeling and Simulation of Concrete Structures: Recent Advances

**Minisymposium organized by Mahdi Kioumarsi and Vagelis Plevris**

- **Chair:** Mahdi Kioumarsi
- **CoChair:** Leila Farahzadi

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<th>Authors</th>
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<td>MS76A</td>
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<td>8/6/22 16:30 - 18:30</td>
<td>Molecular dynamics investigation of the effect of interlayer cavities of the structure of calcium silicate hydrate at the atomistic scale</td>
<td>Davoud Tavakoli and Mohammad Hamehmamaddian Baghban</td>
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<td>Application of an adaptive stable GFEM for fracture propagation in plain concrete</td>
<td>Abdelrahman El-Tothia and Faisal Mukhtar</td>
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<td>FEM analysis of FRCM strengthened RC columns exposed to fire</td>
<td>Reem Talo, Salem Khalaf, Muhammad Kyaure and Farid Abot</td>
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<td>Integrated approach to probabilistic nonlinear assessment of concrete bridges</td>
<td>Drahomír Novak, David Lehky, Radomír Pukl, Ondrej Slowik and Novak Lukás</td>
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<td>Nonlinear seismic analysis of reinforced concrete structures using POD reduced order method</td>
<td>Naim Ayoub, Walid Larbi and Jean-François Deü</td>
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<td>Eigenerosion approach for fracture modeling of concrete under impact load using the material point method</td>
<td>Ahmad Chihadeh and Michael Kaliske</td>
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<td>Surface roughness and shear resistance in cracked concrete</td>
<td>Mohit Pundir and Guillaume Anciaux</td>
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### Multiphysics modelling and simulation strategies for processes in fractured porous media

**Minisymposium organized by Kundan Kumar and Sorin Pop**

- **Chair:** Mahdi Kioumarsi
- **CoChair:** Leila Farahzadi

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<td>MS76A</td>
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<td>8/6/22 16:30 - 18:30</td>
<td>A mixed-dimensional model for reactive transport: modeling and computational aspects</td>
<td>Luca Formaggia, Alessio Fumagalli and Anna Scotti</td>
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<td>Modelling fracture propagation in poro-elastic media combining phase-field and discrete fracture models</td>
<td>Samuel Burbulla, Luca Formaggia, Anna Scotti and Christian Rohde</td>
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<td>Fluid flow through naturally fractured reservoirs using an embedded fracture model</td>
<td>Cristian Mejía, Julio Rueda and Deane Roehl</td>
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<td>Impacts of fractures on hydrodynamic trapping for CO2 storage in deep saline aquifers</td>
<td>Yuhang Wang, Cornelis Vuiik and Hadi Hajibeygi</td>
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<td>A numerical analysis of CO2 storage by adsorption using ZIF-8</td>
<td>Guilherme Fonseca da Silva, Lucas Rodrigues Capello Silva, Marcos Oliveira Peli, Bruno Galelli Chieregatti and João de Sá Brasil Lima</td>
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<td>Averaged models for two-phase flow at the pore scale: The effect of surface tension and contact angle dynamics</td>
<td>Stephan B. Lunowa, Arjen Mascini, Corina Bringedal, Tom Bultreys, Veerle Cruyde and Iuliu Sorin Pop</td>
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<td>The Undrained Split Iterative Coupling Scheme for a Fractured Biot Model: Theoretical and Numerical Considerations</td>
<td>Tameem Almani and Kundan Kumar</td>
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## Conference Programme & Technical Sessions

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### Thursday, June 9th

#### 9/6/22 09:00 - 10:30

**Plenary Lectures III**

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<th>Room: B3 + B4</th>
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<tr>
<td><strong>The impact of defeaturing on the accuracy of PDE solutions</strong></td>
<td>Annalisa Buffa</td>
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<tr>
<td><strong>The Advent of Continuum-Kinematics-Inspired Peridynamics: A Novel Take on Nonlocal Continuum Modelling and Simulation</strong></td>
<td>Paul Steinmann</td>
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#### 10:30 - 11:00

**Coffee Break**

#### 11:00 - 13:00

**Technical Sessions**

#### 9/6/22 11:00 - 13:00

**The Combined Role of Modelling, Simulation, Optimization, Control and Digitalization for Solving New Computational Challenges of Aviation, Transport and Renewable Energy II**

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<th>Room: Hedmark (GF)</th>
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<tr>
<td><strong>An overview on future challenges of aerodynamic configuration design for distributed propulsion vehicle</strong></td>
<td>Shaojun Luo, Zhili Tang, Tianzi Eng, Qianrong Ma, Jinyou Su, Gabriel Bugeda and Jacques Periaux</td>
</tr>
<tr>
<td><strong>Transportation and the Global Spread of Infectious Disease</strong></td>
<td>William Fitzgibbon and Jef. J. Morgan</td>
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<td><strong>Large eddy simulations of atmospheric turbulence and complex wind turbine wakes</strong></td>
<td>Ning Zhao</td>
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<tr>
<td><strong>High-fidelity CFD in the cloud as a key enabler for transport and renewable energy challenges</strong></td>
<td>Charles Mockett</td>
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**Location Overview**

- **Thon Hotel Arena**
- **NOVA Spektrum Center**
CONFERENCE PROGRAMME & TECHNICAL SESSIONS

9/6/22 11:00 - 13:00
Bayesian inference of engineering models: advances in theory and applications III
MS32C
Room: Nord – Norge (GF)
Chair: Giovanni Samaey

- Bayesian identification of oil spill source parameters from image contours
  Samah El Mohtar, Olivier Le Maître, Omar Knio and Ibrahim Hoteit
- Hierarchical Bayesian model for simulating the mechanical behavior of bare printed circuit boards with fixing
  Hendrik Schmidt, Markus Kaess, Moritz Huebsebrock and Roland Lichtinger
- Bridging POMDPs and Bayesian decision making for robust maintenance planning for railway systems
  Giacomo Arigoni, Cyprien Hoelzl, Oliver Schwery and Eleni Chatzi
- Polynomial Surrogates For Bayesian Traveltime Tomography
  Pierre Sochala, Alexandre Gesret and Olivier Le Maître
- Model calibration and damage detection for a digital twin
  Thomas Titscher, Annika Robens-Radermacher and Jörg F. Unger
- A probabilistic incompressible hyperelastic material constitutive model for human brain tissue
  M. Zeraatpisheh and L. Beex

9/6/22 11:00 - 13:00
Multi-physics simulations with the coupling library preCICE I
MS46A
Room: Oslo 1 (GF)
Chair: Benjamin Uekermann

- An introduction to the preCICE coupling library
  Frédéric Simonis and Benjamin Benjamin
- Simulation of multi-physics porous-media applications using partitioned black-box methods
  Alexander Joula and Miriam Schulte
- Heat and mass transfer between XDEM & OPENFOAM using preCICE coupling library
  Prasad Adhav, Xavier Besseron, Alban Rousset, Alvaro Antonio Estupinan and Bernhard Peters
- Coupling 1D thermohydraulics with 3D CFD via preCICE
  Gerasimos Chourdakis, Kin-Wing Wong, Fabian Weyermann and Benjamin Uekermann
- Adaptive and flexible macro-micro coupling software
  Ishaan Desai, Benjamin Uekermann and Carina Bringedal
- MaMiCo-preCICE coupling for hybrid molecular-continuum flow simulations
  Louis Vot and Philipp Neumann

9/6/22 11:00 - 13:00
Advances in SHM guided by artificial intelligence and data fusion I
MS102A
Room: Nordland (GF)
Chair: Ilaria Venanzi
CoChair: Noemi Friedman

- Advanced deep learning comparisons for non-invasive tunnel lining assessment from ground penetrating radar profiles
  Marco Martino Rosso, Giulia Marasco, Leonardo Tanzi, Salvatore Aiello, Angelo Aloisio, Raffaele Cucuzza,
  Bernardino Chiara, GianSalvo Cirrincione and Giuseppe Carlo Marano
- Classification of compromised DOFS data with LSTM neural networks
  Valeria Usenza and Kaspar Lasn
- Machine learning for explainability of structural health monitoring data of a viaduct
  Noemi Friedman, Zeynep Tasci, Uros Bohinc and Jan Kalinc
- Deep neural networks for unsupervised damage detection on the Z24 bridge
  Valentina Giglioni, Ilaria Venanzi, Valentina Poggioni, Alina Elena Baia, Alfredo Milani and Filippo Ubertini
- Enabling supervised learning in structural health monitoring by simulating damaged structure responses through physics based models
  Luca Rosafalco, Andrea Manzoni, Stefano Mariani and Alberto Corigliano

9/6/22 11:00 - 13:00
Mathematical and Computational aspects of Mixed-Dimensional Coupling Problems I
MS120A
Room: Oslo 2 (GF)
Chair: Ingeborg Gjerde
CoChair: Luca Possenti

- Finite strain poromechanics for fractured porous media
  Wietse M. Boon and Jan M. Nordbotten
- Linear and nonlinear 1d-3d models for flow and transport in porous media with embedded tubular networks
  Timo Koch, Martin Schneider and Kent-André Mardal
- 3D-1D coupled problems with a PDE-constrained optimization method
  Stefano Berrone, Denise Grappein, Stefano Scialò and Fabio Viola
- Forming a well-posed model of poroelasticity in the presence of fractures
  Wietse M. Boon and Jan M. Nordbotten
## Conference Programme & Technical Sessions

### 9/6/22 11:00 - 13:00

**Advances in solution strategies for physical processes in porous media with complex geometries I**  
Minisymposium organized by Alessio Fumagalli, Elyes Ahmed and Michele Starnoni  
Room: Rogaland (GF)  
Chair: Elyes Ahmed  
CoChair: Alessio Fumagalli

- **Dynamic coarsening for efficient, high-resolution simulation of geothermal systems**  
  (Keynote Lecture)  
  Øystein Klemetsdal

- Potential reconstruction techniques for a posteriori error estimation: a guided tour  
  Jhabriel Varela, Elyes Ahmed, Eirik Keilegavlen, Jan Martin Nordbotten and Florin Adrian Radu

- Energy-stable discretization of two-phase flows in deformable porous media with frictional contact at matrix-fracture interfaces  
  Francesco Bonaldi, Jérôme Droniou, Roland Masson and Antoine Pasteau

- Model adaptation in a discrete fracture network: existence of solutions and numerical strategies  
  Francesco Pataccini and Alessio Fumagalli

- Model verification for flow in fractured media  
  Jakub W. Both, Bergit Bratteklås, Martin Ferne, Eirik Keilegavlen and Jan M. Nordbotten

### 9/6/22 11:00 - 13:00

**Recent developments and current issues in the phase-field modeling of fracture IV**  
Minisymposium organized by Dhananjay Phansalkar, Paras Kumar, Pietro Carrara, Sigrid Leyendecker, Julia Mergheim, Laura De Lorenzis and Paul Steinmann  
Room: Romerike (GF)  
Chair: Dhananjay Phansalkar

- Hybrid discrete element and raytracing framework for the analysis of powder-bed additive manufacturing  
  Bram J.A. Dorusse, Marc G.D. Geers and Joris J.C. Remmers

- Peridynamics for Selective Laser Melting  
  Michael Pozzi and Michael W. Gee

- Particle Finite Element Method for simulations of Selective Laser Melting with vaporization  
  Simon Fèvrier, Romain Boman and Jean-Philippe Ponhot

- The numerical investigation of thermal cycle of laser surface hardening  
  Janusz Pikula, Marek St. Weglowski and Jerzy Dvorak

- Kinetic Modelling of Phase Fraction Prediction on an Additive Manufacturing Process  
  Roya Darabi, Ana Reis and Jose Cesar de Sa

### 9/6/22 11:00 - 13:00

**Modelling at different scales of processes involving melting and solidification of metals**  
Minisymposium organized by Jose Cesar de Sa and Michel Bellet  
Room: Sør – Norge (GF)  
Chair: Jose Cesar de Sa  
CoChair: Jose Cesar de Sa

- Nonlinear additive and multiplicative preconditioning strategies for monolithic phase-field fracture models  
  Alena Kopanicakova, Hardik Kothari and Rolf Krause

- Isogeometric space-time adaptivity for phase field-based fracture of shells  
  Karsten Paul, Thomas J.R. Hughes, Chad M. Landis and Roger A. Sauer

- An enriched phase-field method for the efficient simulation of fracture processes, part 1: phase-field approximation  
  Verena Klempt, Christian Krüger and Stefan Loehnert

- An enriched phase-field method for the efficient simulation of fracture processes, part 2: displacement-field approximation  
  Christian Krüger, Verena Klempt and Stefan Loehnert

### 9/6/22 11:00 - 13:00

**Low Reynolds number flows: from microswimmers to microdrones I**  
Minisymposium organized by Matteo Giacomini, Manuel Garcia-Villalba and Ignazio Maria Viola  
Room: Akershus (1F)  
Chair: Manuel García-Villalba  
CoChair: Ignazio Maria Viola

- A computational tool for parametric design of microswimmers  
  (Keynote Lecture)  
  Matteo Giacomini and Antonio Huerta

- A Computational Framework for Micro-Swimming: Benchmarks and Applications  
  Christophe Prud’homme, Luca Bert, Vincent Chabannes and Laetitia Giraldi

- A finite element method for the Cosserat rod to describe undulatory locomotion  
  Lukas Deutz

- The flight of Alsomitra macrocarpa  
  Daniele Cerro, Cathal Cummins, Francesco Giorgio-Serchi, Yunjie Yang, Naomi Nakayama and Ignazio Maria Viola

- Comparison of low and high fidelity models for the analysis of flapping wing micro air vehicles  
  Romain Paletti, Lilla Koloszar, Miguel Mendez, Jeroen van Beeck and Joris Degroote
### 9/6/22 11:00 - 13:00
#### Laminar to Turbulence Transition in Aero/Hydrodynamics I
**Minisymposium organized by Mostafa Safdari Shadloo and Abdellah Hadjadj**

**Room:** Buskerud (1F)
**Chair:** Mostafa Shadloo

- **Control of oblique breakdown using streak employment method (Keynote Lecture)**
  - Muhittin Celep, Abdellah Hadjadj and Mostafa Safdari Shadloo

- Investigation of interactions between suction chamber and boundary layer over suction walls using direct numerical simulations
  - Richard van Selderhoff and Heinrich Lüdeke

- The interaction between an isolated roughness element and free-stream turbulence
  - Masumeh Gholamisheeri, Kristina Durovic, Santosh Mamidala, Jens Fransson, Ardeshir Hanifi and Dan Henningson

- Transition of separated flow over a bump under unsteady inflow conditions
  - Himpu Marbona, Alejandro Martínez-Cava Aguilar and Daniel Rodríguez Alvarez

- On the algebraic modifications of traditional turbulence models to predict by-pass and separation induced transition
  - Alessandro Colomba, Andrea Crivellini, Antonio Ghidoni, Alessandra Nigro and Gianmaria Noventa

### 9/6/22 11:00 - 13:00
#### Physics- and Data-Driven Modelling Techniques for Digital Twins I
**Minisymposium organized by Oliver Barrowclough, Jeroen Broekhuisen, Kjetil Johannessen and André Stark**

**Room:** Hordaland 1 (1F)
**Chair:** Georg Muntingh

- Physics-driven digital twin for laser powder bed fusion on GPUs
  - Stephanie Ferreira, Benjamin Klein and André Stark

- A comparison of equation-based and machine learning models of industrial scale deposition processes
  - Paris Papavasileiou, Elieni D. Koranaki, Gabriele Pozzetti, Martin Kathrein, Christoph Czettl, Andreas G. Boudouvis and Stéphane P.A. Bordes

- Digitization Principles for Application Scenarios towards Digital Twins of Organizations
  - Anna Summereder and Robert Woitsch

- Interpretable and scalable Reduced Order Modelling for Digital Twins in manufacturing
  - Valentia Zambrano, Salvador Izquierdo and Manuel Laspalas

- Digital twins for cyber-physical systems
  - Peter Gorn Larsen, Jalll Bouhdjar, Lukas Esterle, Mirgita Frasheri, Claudio Gomez, Alexandros Iosifidis, Hugo Macedo, Emil Madsen, Carl Schultz, Prasad Talasila, Casper Thule and Jim Woodcock

- Geometric reconstruction for digital twins
  - Oliver Barrowclough, Sverre Briseid and Georg Muntingh

### 9/6/22 11:00 - 13:00
#### Mathematical and Numerical Modelling of COVID-19 Epidemic I
**Minisymposium organized by Luca Dedè, Nicola Parolini and Christian Vergara**

**Room:** Hordaland 2 (1F)
**Chair:** Nicola Parolin

- Uncertainty quantification and identifiability of SIR-like dynamical systems for epidemiology
  - Lorenzo Tornatore, Chiara Piazzola and Raul Tempone

- Multi-patched epidemic models with partial mobility, residency, and demography

- System inference via field inversion for the spatio-temporal progression of infectious diseases: Studies of COVID-19 in Michigan and Mexico
  - Krishna Garikipati, Mariano Carrasco-Teig, Zhenlin Wang, Gregory Teichert and Xiaoxuan Zhang

- A numerical set-up for the simulation of infection probability from SARS-CoV-2 in public transport vehicles
  - Eugenio Schillaci, Jordi Vera, Nina Morozova and Joaquim Rigola

- A Multi-Physics Model for the Prediction of Coronavirus Inactivation in Populated Rooms using 222 nm Far-UVC
  - Andrew G Buchan, Coumghen Sannassy, Liang Yang, Kirk D. Atkinson, David Welch and David J. Brenner

- Modelling the COVID-19 pandemic: variants and vaccines
  - Alicia Kubik, Angel M. Ramos, Benjamin Iovora, Maria Vela-Pérez and Miriam R. Ferrández

### 9/6/22 11:00 - 13:00
#### Deep learning for Hamiltonian problems and variational analysis
**Minisymposium organized by Emmanuel Franck, Laurent Navoret and Yannick Privat**

**Room:** Vestfold (1F)
**Chair:** Emmanuel Franck

- Learning an optimal feedback operator semiglobally stabilizing semilinear parabolic equations
  - Sergio S. Rodrigues

- Structure-Preserving Neural Networks for the N-body Problem
  - Philipp Herr, Barry Koren and Simon Portegies Zwart

- Data driven reduced modelling of the Vlasov-Poisson equation
  - Guillaume Stéfane, Emmanuel Franck, Laurent NAVoret, Nicolas Crouseilles and Vincent Vigo

- A Tensor Gradient Cross for Hamilton-Jacobi-Bellman equations
  - Sergey Dolgov, Dante Kalise and Luca Saluzzi

- Towards model reduction of individual-based models in epidemiology; when reinforcement learning meets control theory.
  - Clémentine Courtès, Emmanuel Franck, Killian Lutz, Laurent Navoret and Yannick Privat

- Structure-preserving Scientific Machine Learning
  - Michael Kraus
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<td>Computational Modelling with OpenFOAM I</td>
<td>Minisymposium organized by Gavin Tabor and Fred Mendonca</td>
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<td>Characterization of polymeric mixing processes with non-conforming methods in OpenFOAM</td>
<td>giorgio negrini, nicola parolini, marco verani and daniele cerroni</td>
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<td>Diurnal cycles of slope winds with OpenFOAM</td>
<td>Adeline Montlaur, Rathna B Athota, Santiago Arias and Jose I. Rojas</td>
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<td>Remeshing – CFD simulation of moving objects with overlapping trajectories</td>
<td>Bahram Hosseini, Christian Jordan and Michael Harasek</td>
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<td>Effect of hydrogen addition to methane-air jet flame based on Sandia flame D</td>
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<td>A two-scale phase-field model for reactive transport in porous media with evolving pore-scale geometry</td>
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<td>Manuela Bastidas, Carina Bringedal, juliu Sorin Pop and Lars von Wolff</td>
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<td>Registration-based model reduction of parameterized POEs with spatio-parameter adaptivity</td>
<td>Tommaso Taddei</td>
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<td>Application of model order reduction to the analysis of polymer processing problems</td>
<td>Fabian Key and Stefanie Elgeti</td>
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<td>A hybrid knowledge- and data-driven reduced model for almost thin porous materials</td>
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<td>A PBDW approach to Hamilton-Jacobi-Bellman equations</td>
<td>Samuel Knop and Karsten Urban</td>
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<td>Uterine prolapse repair surgery: a finite element analysis</td>
<td>Elísabete Silva, Marco Parente, Teresa Mascarenhas, Renato Natal Jorge and António Fernandes</td>
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<td>Towards a tissue model based on tissue mechanics and histological data</td>
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<td>Serjosa Robmann, Simen Vergote, Jan Deprest and Edoardo Mazza</td>
<td>Serjosa Robmann, Simen Vergote, Jan Deprest and Edoardo Mazza</td>
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<td>Biomechanical study of abnormal uterine activity during a vaginal delivery using an electro-chemomechanical constitutive model</td>
<td>Daniel Fidalgo, Margarida Borges, Maria Vila-Pouca, Dulce Oliveira, Ewelina Malanowska, Kristin Myers, Marco Parente and Renato Natal</td>
<td>Daniel Fidalgo, Margarida Borges, Maria Vila-Pouca, Dulce Oliveira, Ewelina Malanowska, Kristin Myers, Marco Parente and Renato Natal</td>
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<td>Christof Bauer</td>
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<td>Julie Dian</td>
<td>Julie Dian</td>
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<td>Tobias Laschuetz and Thomas Seelig</td>
<td>Tobias Laschuetz and Thomas Seelig</td>
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<td>A modified cohesive zone model for the simulation of mixed-mode fracture of co-consolidated thermoplastic laminates considering fiber bridging</td>
<td>Ioannis Sioutis and Konstantinos Tserepis</td>
<td>Ioannis Sioutis and Konstantinos Tserepis</td>
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<td>A mixed mode cohesive law for delamination in GRP laminates with large scale bridging</td>
<td>Reidar K. Jaki, Frode Grytten, Jens K. Jørgensen and Bent F. Sørensen</td>
<td>Reidar K. Jaki, Frode Grytten, Jens K. Jørgensen and Bent F. Sørensen</td>
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<td>Efficient calibration of a crystallization model for injection moulding simulation using surrogate modelling</td>
<td>Sandra Saad, Camilo Cruz, Gilles Regnier and Amine Ammar</td>
<td>Sandra Saad, Camilo Cruz, Gilles Regnier and Amine Ammar</td>
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CONFERENCE PROGRAMME & TECHNICAL SESSIONS

9/6/22 09:00 - 10:30
Mathematics of Sea Ice, Ice Sheets and Ice Shelves I
Minisymposium organized by Carolin Mehlmann and Clara Burgard

Efficient Discontinuous Galerkin Method for Maxwell Elasto-Brittle Sea Ice Model
Piotr Minakowski and Thomas Richter

Robust and scalable Newton-type methods for visco-plastic sea-ice models
Yu-Hsuan Shih, Carolin Mehlmann and Georg Stadler

Generalization of hydrodynamic sea ice dynamics using kinetic theory and the Boltzmann equation
Andrew Davis, Dimitris Giannakis, Sam Stechmann and Georg Stadler

A primal-dual formulation for numerical simulations of marine ice sheets with various friction laws
Thomas Gregov, Frank Pattyn and Maarten Arnst

The effect of the tracer staggering on sea ice deformation fields
Carolin Mehlmann

Comparative study on finite element methods for modeling sea ice dynamics
Carina Schwarz and Jörg Schröder

9/6/22 09:00 - 10:30
Robust and reliable numerical methods in poromechanics I
Minisymposium organized by Fleurianne Bertrand and Jakub Both

A posteriori error estimates by weakly symmetric stress reconstruction for the Biot problem
Gerhard Starke and Fleurianne Bertrand

Robust discretizations for the biphasic Theory of Porous Media
Maximilian Brodbeck, Fleurianne Bertrand and Tim Ricken

Polytopal nonconforming discretization methods for multiple-network poroelasticity and thermo-poroelasticity
Paola F. Antonietti, Stefano Bonetti, Michele Botti and Daniele A. Di Pietro

On space-time finite element approximations of the dynamic biot system
Markus Bause, Uwe Köcher and Florin A. Radu

Coupling of flow and mechanics in fractured porous media
Kundan Kumar

A global/local approach for parameter estimation in phase-field fracture problems
Amirreza Khodadadian, Nino Noii, Maryam Parvizi and Thomas Wick

9/6/22 09:00 - 10:30
Soft biological tissue: microstructure-based modeling and simulation I
Minisymposium organized by Bjørn Skallerud and Gerhard A. Holzapfel

Predictive Constitutive Modeling of Arteries by Deep Learning (Keynote Lecture)
Christian Cyron, Kevin Linka, Selda Sherifova, Cristina Cavinato, Gerhard Holzapfel and Jay Humphrey

Patient-specific simulation of degenerative mitral valve apparatus
Muhammad Juwaad Sattayehini, Hans Martin Aguilera, Robert Matango Persson, Stig Urheim, Vegard Skalstad

Numerical model of the human trachea based on layer specific material models: application to healthy, diseased and stented trachea.
Venkat Ayyalasomayajula and Bjørn Skallerud

Mechanical characterisation and modelling of the layer-dependent, anisotropic behaviour of the human oesophagus
Ciara Durcan, Mokarram Hossain, Grégory Chagnon, Djordje Perić and Édouard Girard

The importance of intraluminal thrombus on abdominal aortic growth – a numerical study
Igor Karša, Nino Horvat and Lana Virag

9/6/22 09:00 - 10:30
Advances in numerical methods for inhomogeneous viscous flows: non-Newtonian, viscoelastic, multi-phase, eddy-viscosity and other complex models I
Minisymposium organized by Douglas Pacheco and Richard Schussnig

A finite element modeling of two-phase variable density surface fluids (Keynote Lecture)
Maxim Olshanskii, Yerbol Palzhanov and Annalisa Quaini

Reduced-order modeling of generalized Newtonian fluids including engineering applications
Ernesto Castillo and Camilo Bayona

A semi-implicit method for thrombus formation in haemodynamic fluid-structure interaction
Richard Schussnig, Simon Dreymann, Alireza Jafarinia, Thomas Hochrainer and Thomas-Peter Fries

Newton-multigrid fem solver for the simulation of thixo-viscoplastic flow problems
Noheed Begum, Abderrahim Ouazzi and Stefan Turek
### CONFERENCE PROGRAMME & TECHNICAL SESSIONS

#### 9/6/22 09:00 - 10:30

**Current Trends in Modelling and Simulation of Turbulent Flows I**  
Minisymposium organized by Suad Jakirlic

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| **The P-DNS Method to Solve Particle-Laden Turbulent Fluid Flows (Keynote Lecture)**  
Sergio Idelsohn, Juan Gimenez and Eugenio Oñate |
| Towards scale-resolved simulation of airfoil stall at high Reynolds numbers using the lattice Boltzmann method  
Sam Mitchell, Sina Stapelfeldt, Christoph Brandstetter and Ricardo Puente |
| Investigation of the PANS Method for the Prediction of Aerodynamic Noise Around a Circular Cylinder  
Arezzo Moosavifard, Elena Kolb, Michael Schüller and Suad Jakirlic |
| On the development of a discontinuous Galerkin solver for the composite RANS-(I)LES  
Francesco Bassi, Alessandro Colombo, Antonio Ghidoni, Francesco Carlo Massa and Gianmaria Noventa |

#### 9/6/22 09:00 - 10:30

**Probabilistic methods for model inadequacy**  
Minisymposium organized by Teresa Portone, Kathryn Maupin and Rebecca Morrison

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| **Hyper-differential sensitivity analysis with respect to model discrepancy**  
Joseph Hart |
| **Informing missing physics with model form error and model selection**  
Kathryn Maupin, Jaideep Ray and Teresa Portone |
| **Data-Driven Model-Form Uncertainty with Bayesian Statistics and Neural Differential Equations**  
Teresa Portone, Erin Acquesta, Christopher Rackauckas and Raj Dandekar |
| Bayesian Surrogate Analysis and Uncertainty Propagation in the light of Model (In)Adequacy  
Saicha Ranftl and Wolfgang von der Linden |
| Accounting for model uncertainty in the identification of partially known models  
Nicholas Galioto and Alex Gorodetsky |
| Wake Redirection Control for Optimization of Wind Farm Power Production  
Jeferson Almeida, Iago Chaves, Vinicius Silvestre and Fernando Rochinha |

#### 9/6/22 09:00 - 10:30

**Multi-Scale and Multi-Level Numerical Methods for Non-linear Solids**  
Minisymposium organized by Frédéric Lebon and Isabelle Ramírez

| Room: Jan Mayen 2 | Chair: I. Ramíre  
CoChair: F. Lebon |
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| **Multiscale modelling of repeated impacts: case of ultrasonic shot peening**  
Cécile Nauquier-Lebon, Thomas Rousseau, Philippe Gilles and Thierry Hoc |
| **Enhanced Non-Uniform Transformation Field Analysis**  
Akanksha Mishra, Pietro Carrara, Sonia Marfia, Elio Sacco and Laura De Lorenzis |
| **Efficiency of boundary conditions on the computation of local fields in a Representative Volume Element**  
Louis Belgrand, Isabelle Ramíre, Rodrigue Largenton and Frédéric Lebon |
| **Multi-model structural coupling in non-linear statics: a robustness study**  
Stéphane Guinard, Omar Bettinotti, Victor Oancea, Olivier Allix, Pierre-Alain Boucard and Pierre Gosselet |
| **A discrete element method for granular solids with a level set shape description**  
Jerome Duriez, Cedric Galusinski, Frederic Golay and Stephane Bonelli |
| **Large deformation multi-scale analysis of thin nanocomposite shell structures**  
Gerasimos Sotiropoulos and Vissarion Papadopoulos |

#### 9/6/22 09:00 - 10:30

**Interdisciplinary challenges towards exascale fluid dynamics I**  
Minisymposium organized by Niclas Jansson, Stefano Markidis, Philipp Schlatter, Matts Karlsson and Erwin Laure

| Room: Jan Mayen 3 | Chair: Niclas Jansson  
CoChair: Martin Karp |
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| **Large-scale direct numerical simulations of low-Prandtl-number convection (Keynote Lecture)**  
Dmitry Krasnov, Ambrish Pandey, Katepalli Sreenivasan and Joerg Schumacher |
| **Implementation of Hybrid CFD/CAA methods for the Prediction of Aeroacoustic Sound on HPC Systems**  
Mathias Meinke, Miro Gordus, Sutharsan Satchunanathan, Gonzalo Brito-Gadeschi and Wolfgang Schroeder |
| **Load Balancing and Scalability with Code Coupler JMxx**  
Dario Amiranato, Vlad Ganine, Nick Hills and Paolo Adami |
| **Nonlinear Dimensionality Reduction for Three-dimensional Flow Field Around Circular Cylinder with Distributed Parallel Machine Learning on Fugaku**  
Kazuto Ando, Keiji Onishi, Bole Rahul, Akiyoshi Kuroda and Makoto Tsubokura |
| **Computer Architectures for Exascale Computational Fluid Dynamics**  
Martin Karp, Niclas Jansson, Artur Podobas, Philipp Schlatter and Stefano Markidis |
### CONFERENCE PROGRAMME & TECHNICAL SESSIONS

#### 9/6/22 09:00 - 10:30
**Advanced HPC algorithms for large-scale simulations I**
Minisymposium organized by Xavier Álvarez-Farré, F. Xavier Trias, Andrey Gorobets and Takayuki Aoki

**Chair:** Xavier Álvarez Farré

**Room:** Lounge A2

**Language agnostic performance portability solution for heterogeneous applications**
*Anshu Dubey* and *Tom Klosterman*

**GPU accelerated linear algebra packages/solvers for large scales simulations using heterogenous clusters**
*Luca Spiga*, Luigi Capone, Federico Cipollitta, Tommaso Benachio, Marco Jacopo Ferrarotti and Carlo Janna

**Development of a low-level, algebra-based library to provide platform portability on hybrid supercomputers**
Xavier Álvarez-Farré, Adel Abaft-Baldeilou, Guillem Colomer, Andrey Gorobets, F. Xavier Trias and Assensi Oliva

**Parallel Finite Volume Code for Plasma with Unstructured Adaptive Mesh Refinement**
*Imad Kissami*, *Soudail Maazouli* and *Fayssal Benkhaldoun*

**Immersed boundaries in hypersonic flows with considerations about high-fidelity and massive parallelism**
*Florent Noileau*, Thibault Bridel-Bertomeu, Fabien Vivodtzev and Héloïse Beaugendre

**Non-Statistical Uncertainty Quantification Analysis with Parallel CAE Solvers, ADVENTURE**
*Shinobu Yoshimura*, Sota Goto, Shigeki Kaneko and Amane Takei

#### 9/6/22 09:00 - 10:30
**Data-driven Reduced Simulation Models for Industrial Applications I**
Minisymposium organized by Norbert Hosters, Daniel Wolff and Daniel Hilger

**Chair:** Norbert Hosters

**CoChair:** Daniel Wolf

**Room:** Spitsbergen

**N, ROM, ML, PINNs – Four approaches for real-time temperature estimation in electric motors in comparison**
*Henning Sauerland*, Aykasya Miyamoto, Anthony Ohazulike, Huihui Xu and Rik W. De Doncker

**Adaptation of multi-fidelity optimization schemes to nonlinear structural dynamics applications**
*Annie Kous*, Tobias Lehrer, Koushyar Komeilizadeh and Fabian Duddeck

**Reduced Order Models for Interdisciplinary Optimization of a Compressor Blade**
*Lisa Přetetch*, Ilya Arsenev and Fabian Duddeck

**Physical Inspired Data-Driven Models using Evolutionary Approach**
*Sounyeh Hosseinhashemi*, Christoph Thon, Marvin Röhl and Carsten Schilde

**A Data-Driven Reduced Order Modeling Approach Applied in Context of Numerical Analysis and Optimization of Plastic Profile Extrusion**
*Daniel Hilger* and Norbert Hosters

**Data-driven Machine Learning (ML) and Reduced Order Modeling (ROM) Approaches in Industrial Finite Element (FEA) Applications**
*Vasiliyi Tsinanik, Mariyappa Manohara* and *Kambiz Kayvantash*

### 9/6/22 09:00 - 10:30
**Advances in shock capturing strategies for high order methods III**
Minisymposium organized by Jonas Zeljaz, Deep Ray and Andrea Beck

**Chair:** Andres Rueda-Ramirez

**Room:** Svalbard

**Implicit LES of the Transonic Flow Over A High-Pressure Turbine Cascade using DG Subcell Shock Capturing**
*Björn F. Kose*, Christian Morsbach and Edmund Kügeler

**High-order high-fidelity simulation of unsteady shock-wave/boundary layer interaction using flux reconstruction**
*Nicolai Goffert*, Benoît Tartinville, Charles Hirsch and Sergio Pirazzoli

**Unstructured high-order solutions of hovering rotors with and without ground effect**
*Paulo A. S. F. Silva*, Panagiotis Tsoutsanis, Antonis F. Antoniadis and Karl Jenkins

**A three-dimensional FVC scheme on non-uniform tetrahedron meshes: application to the 3D Euler equation**
*Moussa Zagal*, Imad Kissami, Mohamed Boubekeur, Fayssal Benkhaldoun and Imad El mahi

**Robustness and consistency of potentially-stiff multi-way pressure couplings in compressible multi-fluid models**
*Antoine Ull*, Éric Heulhard de Motigny and Bastien Manach-Perennou

**A posteriori MOOD limiting approach for multicomponent flows on unstructured meshes**
*Panagiotis Tsoutsanis* and *Pericles Farmakis*

### 9/6/22 09:00 - 10:30
**Multiscale Methods for Composites and Heterogeneous Materials I**
Minisymposium organized by Paul Steinmann, Guillermo Etse, Daya Reddy and Osvaldo Manzoli

**Chair:** M. Krause

**Room:** O – 3

**RVE-based Homogenisation of Shell Structures using Scaled Boundary Isogeometric Analysis**
*Leonie Mester*, Simon Klarbann and Sven Klinkel

**Variationally consistent homogenisation of shell elements**
*Elias Biréjwons*, Martin Fagerström, Fredrik Larsson and Joris Remmers

**Multiscale simulation of the fracture behavior of fiber reinforced concrete under impact loads**
*Hannah Knobloch* and *Stefan Loehnert*

**A model for paper-water interaction and the resulting swelling**
*Nik Dave*, Ron Peerlings, Thierry Massart and Marc Geers

**Multiscale modeling of heterogeneous structures based on a localized model order reduction approach**
*Philippe Derrich, Karen Veroy, Aninka Robens-Rademacher* and *Jörg F. Unger*
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<td>Digital Twin Cities: Multi-Disciplinary Modeling and High-Performance Simulation of Cities</td>
<td>Anders Logg</td>
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**16:30 - 18:30** | **TECHNICAL SESSIONS**

**9/6/22 16:30 - 18:30**

**Additive Manufacturing, Applications and Numerical Modelling**

**STS10A**

Room: Hedmark (GF)

Chair: Tero Tuovinen

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<td>Laser welding of AM metal parts as solution to provide new innovations for separation industry</td>
<td>Heidi Piili, Saeid Parchegani, Markku Lindqvist, Eetu Kivirasi and Antti Salminen</td>
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<td>Aditya Gopaluni, Heidi Piili and Antti Salminen</td>
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<td>Thermeomechanical modeling of L-PBF 3D printing</td>
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<td>Patricia Nyamekye, Rohit Lakshmanan and Heidi Piili</td>
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**9/6/22 16:30 - 18:30**

**New Trends in Computational Poromechanics at Finite Strain**

**MS27A**

Room: Nord – Norge (GF)

Chair: Pedro Navas

CoChair: Jinhyun Choo

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<td>Zhengshou Lai, Shiwei Zhao and Jidong Zhao</td>
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<td>Coupled CFD-MPM simulation of submarine landslides</td>
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<td>Pedro Navas, Miguel M. Stickle, Àngel Yagüe, Miguel Molinos and Diego Marzanal</td>
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**9/6/22 16:30 - 18:30**

**Advances in SHM guided by artificial intelligence and data fusion II**

**MS102B**

Room: Nordland (GF)

Chair: Ilaria Venanzi

CoChair: Araliya Mosleh

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<td>A new data assimilation framework using the modified Constitutive Relation Error for online structural monitoring: application to shaking-table experiments</td>
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**Multi-physics simulations with the coupling library preCICE II**

**MS46B**

Room: Oslo 1 (GF)

Chair: Gerasimos Chourdakis

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<td>Arved Enders-Seidt, Jason Tsipakins and Kasparas Dzidžis</td>
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<td>A Benchmark for Fluid-Structure Interaction in Hybrid Manufacturing; Simulation with preCICE in OpenFOAM</td>
<td>Sarah Dietrich, Julian Seuffert, Henrik Werner, Nils Meyer, Christian Poppe, Constantin Krauß and Luise Karger</td>
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<td>Simulation of the flow-acoustic-structural interaction in flow ducts using a partitioned approach in the time domain</td>
<td>Jurgen Kersschot, Hervé Denayer, Wim De Roeck and Wim Desmet</td>
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<td>Kyle Davis, David Schneider, Frederic Simonis, Benjamin Uekermann and Miriam Schulte</td>
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<td>Rachel Smith, Gerasimos Chourdakis, Gavin Tabor and Benjamin Uekerman</td>
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**9/6/22 16:30 - 18:30**

**Mathematical and Computational aspects of Mixed-Dimensional Coupling Problems II**  
Minisymposium organized by Cécile Daversin-Catty, Ingeborg Gjerde and Luca Possenti  
Chair: Cécile Daversin-Catty  
**MS120B**  
Room: Oslo 2 (GF)

A framework for upscaling and modelling fluid flow for discrete fractures using conditional generative adversarial networks  
Carlos Augusto Soares Ferreira, Teeratorn Kadeethum, Nikolaos Boukas and Hamid M. Nick

Mixed-dimensional modelling of neuronal group interplay  
Emil Hauge and Maria E. Rognes

Modeling microcirculation at the mesoscale using mixed-dimensional PDEs  
Luca Possenti, Alessandro Cicchetti, Piermario Vitullo, Maria Laura Costantino, Tiziana Rancati and Paolo Zunino

1D-0D-3D coupled models for simulating blood flow and transport processes in breast tissue  
Tobias Koeppl, Andreas Wagner, Marvin Fritz, Barbara Wohlmuth and Chengxue Wu

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**9/6/22 16:30 - 18:30**

**Advances in solution strategies for physical processes in porous media with complex geometries II**  
Minisymposium organized by Alessio Fumagalli, Elyes Ahmed and Michele Starnoni  
Chair: Alessio Fumagalli  
**MS83B**  
Room: Rogaland (GF)

A non-conforming and a conforming approach for non stationary flow simulations in DFMs with complex geometries  
Stefano Berrone, Andrea Borio, Alessandro D’Auria, Stefano Scialò and Fabio Vicini

Numerical simulation of carbon mineralization in the presence of fractures  
Luca Formaggia, Alessio Fumagalli and Anna Scotti

Contact mechanics and fracture flow: A stabilized formulation and a scalable preconditioning framework  
Andrea Franceschini, Laura Gazzola and Massimiliano Ferronato

A comparison of different time integration schemes in the context of image-based NMR relaxation simulations using explicit FEM  
Luis F. Be, Ricardo Leiderman and André M. B. Pereira

Using MRST for modeling and optimization of operational strategies for a geothermal storage plant in Askja, Norway  
Odd Andersens, Øystein Klemetsdal, Halvor Nilsen, Olav Mayner, Stein Krogstad and Robbert van der Ven

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**9/6/22 16:30 - 18:30**

**Enabling Technologies and Simulation Practices for Advanced Scientific and Engineering Computation**  
Minisymposium organized by Alvaro Coutinho, William Barth, Guillaume Houzeaux and Charles Moulinec  
Chair: Alvaro Coutinho  
**MS97A**  
Room: Romerike (GF)

Development of an HPC Multi-Physics Biomass Furnace Simulation and Integration in a Cloud-based Workflow (Keynote Lecture)  
Xavier Besseron, Henrik Rusche and Bernhard Peters

Quantum Monte-Carlo integration for uncertainty quantification in structural problems: An early attempt  
Constantinos Azizakis and Vissarion Papadopoulos

Design And Analysis Of Task-based Parallelization Of A Discontinuous Galerkin Euler Flow Solver On Heterogeneous Architectures  
Sanjeev Sin, Vincent Perrier, Jonathan Jung and Matthieu Hoefele

Efficient mesh deformation based on randomized RBF solvers  
Wiel Bodmer, Augustin Parret-Freaud, Sébastien Da Veiga and Youssef Mesri

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**9/6/22 16:30 - 18:30**

**Brain mechanics across scales**  
Minisymposium organized by Silvia Budday, Kristian Franze, Jochen Guck and Paul Steinmann  
Chair: Silvia Budday  
**MS9A**  
Room: Sør – Norge (GF)

Modelling the multiphysics of ultrasound neuromodulation (Keynote Lecture)  
Antoine Jerusalem, Haoyu Chen, Clara Felix, Davide Folloni, Lennart Verhagen and Jerome Sallet

Exploring the role of different progenitor cell types during human brain development through a physics-based multifield model.  
M. Saeed Faraz, Ingmar Blümcke and Silvia Budday

On the importance of identifying region-dependent hyperelastic material parameters for human brain tissue through finite element analyses  
Jan Hinrichsen, Nina Reiter, Friedrich Paulsen, Stefan Koessmair and Silvia Budday

Viscoelastic stiffness and relaxation of CNS tissue and its impact on neural and glial cells  
Katarzyna Papad and Paul Janmey

Towards in vivo tissue mechanics  
Stephanie Möllmert, Marcus Gutmann, Paul Müller, Kyoo Hyun Kim, Lorenz Meinell and Jochen Guck
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**9/6/22 16:30 - 18:30**
**Low Reynolds number flows: from microswimmers to microdrones - II**

**Minisymposium organized by Matteo Giacomini, Manuel García-Villalba and Ignazio Maria Viola**
- **Chair:** Matteo Giacomini
- **CoChair:** Ignazio Maria Viola

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<td>Benjamin J. Walker, Kenta Ishimoto, Eamonn A. Geoffrey, Clément Moreau and Mohit P. Dalwadi</td>
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<td>Flow-field transition in the wake of a flexible foil at low reynolds number</td>
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<td>Numerical simulation of bioinspired fluid-structure interaction problems using a multi-body structural model</td>
<td>Cayetano Martinez-Murillo, Gonzalo Arranz, Oscar Flores and Manuel Garcia-Villalba</td>
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**9/6/22 16:30 - 18:30**
**Laminar to Turbulence Transition in Aero/Hydrodynamics II**

**Minisymposium organized by Mostafa Safdari Shadloo and Abdellah Hadjadj**
- **Chair:** Mostafa Shadloo

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<td>Investigation of Early Natural Transition Using the SA-Gamma-ReThetaT Turbulence Model</td>
<td>Charles Bilodeau-Bérubé and Éric Laurendeau</td>
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<td>Influence of boundary layer tripping on the flow and sound field produced by a turbulent jet</td>
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<td>Stable, entropy-pressure compatible subsonic Riemann boundary condition for embedded DG compressible flow simulations</td>
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<td>Instability of a flow of a reacting fluid in a vertical fluid layer</td>
<td>Armands Gritsans, Valentina Koliskina, Andrei Kalyskin and Felix Sadyrbaev</td>
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**9/6/22 16:30 - 18:30**
**Physics- and Data-Driven Modelling Techniques for Digital Twins II**

**Minisymposium organized by Oliver Barrowclough, Jeroen Broekhuisen, Ketil Johannessen and Andre Stark**
- **Chair:** Stephanie Ferreira

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<td>Predicting the behaviour of woody biomass particles using deep hidden physics based models.</td>
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**Minisymposium organized by Luca Dede’, Nicola Parolini and Christian Vergara**

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  *Elena Beretta, Andrea Aspri, Alberto Gandolfi and Etienne Wasner*

- Analysis of the Italian vaccination campaign against COVID-19 using the SUIHTER model  
  *Nicola Parolini*

- Numerical modelling of optimal vaccination strategies for SARS-CoV-2  
  *Giovanni Zierei*

- Assessment of the impact of the COVID-19 vaccination campaign in Italy through epidemiological data-assimilation  
  *Davide Possetto, Joseph C. Lemaître, Mario Zanon, Enrico Bertuzzo, Lorenzo Mari, Stefano Miccoli, Renato Casagrandi, Patrizio Pezzotti, Stefano Merler and Andrea Rinaldo*

- Multiscale kinetic transport models for the spread of epidemics with uncertain data  
  *Giulia Bertaglia*

- Modeling to support decision-making against COVID-19: the Italian experience  
  *Giorgio Guzzetta, Valentina Marziano, Flavia Riccardo, Martina Del Manso, Piero Poletti, Mattia Manica, Filippo Trentini, Bruna Maria Rondinone, Fabio Boccuni, Patrizio Pezzotti, Silvio Brusaferro, Giovanni Rezza, Sergio Iavicoli, Marco Ajelli and Stefano Merler*

## Computational Modelling with OpenFOAM II

**Minisymposium organized by Gavin Tabor and Fred Mendonca**

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- Development of a Framework for Internal Combustion Engine Simulations in OpenFOAM  
  *Clemens Gößnitzer and Stefan Posch*

- A continuous forcing immersed boundary approach to solve the VARANS equations in a volumetric porous region  
  *Marco Vergassola* and Oriol Colomés

- OpenFOAM model of fluid-structure interaction in dry wire drawing  
  *Mathieu Vervaecke, Dieter Fauconnier and Joris Degroote*

- Developing a DEM-Coupled OpenFOAM solver for multiphysics simulation of additive manufacturing process  
  *Navid Aminnia, Alvaro Antonio Estupinan Donoso and Bernhard Peters*

- Super-grid Linear Eddy Model as chemical closure for turbulent combustion  
  *Abhilash Menon, Alan Kerstein and Michael Dervennann*

## Knowledge- and data-driven model order reduction II

**Minisymposium organized by Alaa Armiti-Juber, André Mielke, Felix Fritzen, Benjamin Unger and Tim Ricken**

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- Solving parametric PDEs with an enhanced model reduction method based on Linear/Ridge expansions  
  *Constantin Greif, Philipp Junk and Karsten Urban*

- Neural networks with embedded physics-based material models to accelerate multiscale finite element simulations  
  *Marina Maia, Juri Roche and Frans van der Meer*

- Active-learning-based non-intrusive model order reduction  
  *Qinyu Zhang, Dirk Hartmann, Hans J. Bungartz and Juan M. Lorenzi*

- Machine-learning prediction of microscopic bubble-growth characteristics  
  *Jan Bures, Lubomir Bures, Mattia Bucci and Matteo Bucci*
### Female Pelvic Floor Biomechanics

**Minisymposium organized by** Rita Rynkevic, Dulce Oliveira and Elisabete Silva

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<td>Shape Morphing Techniques to Adapt Pelvic Structures</td>
<td>Margarida Chiote, Elisabete Silva, Sofia Brandão, Marco Parente and António Fernandes</td>
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<td>Numerical simulation of the onset of the second stage of labor</td>
<td>Alice M. Collier, Ghaidaa A. Khaid, Mike D. Jones, Kristin Myers and Antione Jerusalem</td>
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### Mathematics of Sea Ice, Ice Sheets and Ice Shelves II

**Minisymposium organized by** Carolin Mehlmann and Clara Burgard

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<td>Material point method for large deformation seismic response analysis</td>
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<td>Filtering spurious high-frequency modes in landslide impact on an offshore infrastructure</td>
<td>Avshalom Ganz, Pavel Trapper and Miriam Gindis</td>
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### Recent Advances in Numerical Simulation of Landslides and Debris Flows

**Minisymposium organized by** Pavel A. Trapper

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<td>Johannes Kraus, Qingguo Hong, Maria Lymbery and Fadi Philo</td>
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<td>A multigrid method for the Biot system of poroelasticity on logically rectangular grids</td>
<td>Javier Caratéguia, Carmen Rodrigo, Andrés Arraús and Laura Portero</td>
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<td>A review of coupling strategies for modeling fluid flow and geomechanics</td>
<td>Roberto Quevedo and Deane Roehl</td>
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## CONFERENCE PROGRAMME & TECHNICAL SESSIONS

### 9/6/22 16:30 - 18:30

#### Soft biological tissue: microstructure-based modeling and simulation II

**Minisymposium organized by Bjørn Skallerud and Gerhard A. Holzapfel**

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- Modeling coupled interaction of lipid Membranes with embedded filaments  
  *Sanjay Dharmavaram and Basant Lal Sharma*
- Coarse-grained Steered Molecular Dynamics Simulations of Collagen Fibrils  
  *Julia Rambau and David Kammer*
- Local micromorphic non-affine anisotropy describing relative elastic fibre-matrix kinematics  
  *Sebastian Skatulla, Carlo Sansour and Georges Limbert*
- An arterial constitutive model accounting for collagen cross-linking  
  *Gerhard A. Holzapfel, Stephan Teichtmeister and Ray W. Ogden*
- Linking biophysical muscle models with finite element solver  
  *Bogdan Milicevic, Momcilo Prodanovic, Danica Prodanovic, Boban Stojanovic, Srboljub Mija Grill, Miles Kojic and Nenad Filipovic*  

### 9/6/22 16:30 - 18:30

#### Advances in numerical methods for inhomogeneous viscous flows: non-Newtonian, viscoelastic, multi-phase, eddy-viscosity and other complex models II

**Minisymposium organized by Douglas Pacheco and Richard Schussnig**

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- A coupled projection scheme for the Navier-Stokes/Allen-Cahn model  
  *Jean Detecq, Driss Yakoubi and Gérard Lionel Nédélec Khouamo*
- Anisotropic mesh adaptation for viscoelastic fluid flows  
  *Stefan Witschbeke, Ajay Rangarajan, Leszek Demkowicz and Marek Behr*
- Pressure Poisson fractional-step schemes for incompressible two-phase flows: Eliminating artificial boundary conditions and inf-sup compatibility restrictions  
  *Douglas Ramalho Queiroz, Pacheco and Richard Schussnig*
- Rheological properties of a two-phase system with second-order suspending fluid using a cell model approach  
  *Liam Escott and Helen Wilson*
- Sustaining pressure gradients in molecular dynamics simulations of fluid-flow through slab geometries  
  *Mohamed T. Elwag, Lars Pastewka and Peter Gumbsch*  

### 9/6/22 16:30 - 18:30

#### Current Trends in Modelling and Simulation of Turbulent Flows II

**Minisymposium organized by Suad Jakirlic**

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- Validation on a new anisotropic four-parameter turbulence model for low Prandtl number fluids  
  *Lucia Sirović, Giacomo Barbi, Andrea Chierici, Valentina Giovacchini and Sandro Manservisi*
- Near-wall Reynolds stress modelling based on elliptic blending: physical rationale and application to separated flows  
  *Sebastian Wegt, Robert Maduta and Suad Jakirlic*
- Development of a discontinuous Galerkin solver for the simulation of turbine stages  
  *Alessandro Colomino, Antonio Ghidoni, Edoardo Manteca, Gianmarino Noventa, Stefano Rebay and David Pasquale*
- Assessment of numerical frameworks for turbulence transition modelling in pulsatory flows  
  *Philipp Milovic, Igor Karšaj and Željko Tuković*
- Simulation of massively separated flows and rotating machine flows using hybrid models  
  *Florian Miralles, Bastien Sauvage, Stephen Wornom, Bruno Kebous and Alain Dervieux*  

### 9/6/22 16:30 - 18:30

#### Computational Methods for Inverse Wave Problems

**Minisymposium organized by Dan Givoli and Marc Bonnet**

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<td>MS109A</td>
<td>Jan Mayen 1</td>
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- Seismic Inversion and Optimal Transport (Keynote Lecture)  
  *Bjorn Engquist*
- A Multi-Stage Numerical Procedure for Computing all the Parameters of Elastic scatterers from its FFP measurements  
  *Izar Azpilicu, Helene Baruca, Julien Diaz and Tobia Dielliou*
- Seismic Imaging using Full Reciprocity-gap Waveform Inversion  
  *Florian Faucher, Maarten V. de Hoop and Otmar Scherzer*
- Detection of Voids and Cracks with Mono- and Multi-Parameter Full Waveform Inversion  
  *Tim Bürcchner, Philipp Kopp, Stefan Kollmannsberger and Ernst Rank*
- Analysis of topological derivative for qualitative identification using elastic waves  
  *Marc Bonnet*
- An Inverse Convolution Method for Source and Damage Detection in Periodic and Homogeneous Media  
  *Péris Boukadi, Luca Sangiuliano, Claus Claey, Mohamed Ichchou, Wim Desmet and Elke Decker*
CONFERENCE PROGRAMME & TECHNICAL SESSIONS

9/6/22  16:30 - 18:30
Mathematical models and simulation tools for functional coatings
Minisymposium organized by Natalia Konchakova, Peter Klein, Ulf Schoeneberg, Daniel Hoeche and Heinz A. Preisig

Multiscale Simulation of Functional Coatings For Catalytic Applications
Glenn Jones

Computational modelling of plasma electrolytic oxidation process induced damage in extruded Mg material
Eugen Goenbiller, Sohail Mansoor, Natalia Konchakova, Maria Serdechnova, Carsten Blawert, Mikhail Zheludkevich and Daniel Hoeche

Wear Models for plastic injection moulds failures
Amaya Jomaine, Borja Zabala and Raquel Bayon

On the way to digitalization of coating industry
Natalia A. Konchakova, Peter Klein and Heinz A. Preisig

Model topology of active protective coating
Heinz A Preisig, Peter Klein and Natalia Konchakova

Reliable materials modelling translation for interfacial and transport phenomena
Martin T. Horsch, Silvia Chiacchiera, Christoph Niethammer, Bjorn Schember, Felix Diewald, Peter Klein, Simon Stephan, Heinz A. Preisig, Natalia A. Konchakova and Welchly L. Cacopardo

Business decisions modelling in a multi-scale material selection & design framework: case of VIPCOAT H2020 project
Salim Belouettar, Peter Klein, Natalia Konchakova and Carlos Kavka

9/6/22  16:30 - 18:30
Advanced HPC algorithms for large-scale simulations II
Minisymposium organized by Xavier Alvarez-Farré, F. Xavier Trias, Andrey Gorobets and Takayuki Aoki

Highly parallel multi-level preconditioners for incompressible flow problems
Sven Baars, Alexander Heinlein, Jonas Thies and Fred W. Wubs

A Parallel Solver for CFD based on the Alternating Anderson-Richardson Method
Li Juan Chen, Simdo Marques and Nicholas Hills

Role of rounding in implementing gradient descent with low-precision representation
Li Xia, Stefano Massel, Michiel Hochstenbach and Barry Koren

Efficient strategies for solving the variable Poisson equation with large contrasts in the coefficients
Abdel Aslan, Andréa Roy, Xavier Alvarez-Farré, Andrey Gorobets and F. Xavier Trias

Computational solution of the linearized Boltzmann equation with ab initio potential
Thanasis Boskantos and Dimitris Valougeorgis

9/6/22  16:30 - 18:30
Interdisciplinary challenges towards exascale fluid dynamics II
Minisymposium organized by Niclas Jansson, Stefano Markidis, Philipp Schlatter, Mats Karlsson and Erwin Laure

Evaluation of infection risk due to airborne virus transmission in an restaurant environment (Keynote Lecture)
Rahul Bale, Ching-Gang Li, Hajime Fukudome, Saori Yumino, Akifumi Iida and Makoto Tsubokura

Preparing a Fortran legacy code for the upcoming exascale architectures
Joffrey Legaux and Gabriel Staffelbach

Large-scale DNS of turbulence with efficient and accurate particle tracking
Cristian C. Labescu, Bérenger Bramas, Markus Rampp and Michael Wilczek

Refactoring legacy Fortran applications to leverage modern heterogenous architectures in extreme-scale CFD
Niclas Jansson, Martin Karp, Artur Podobas, Stefano Markidis and Philipp Schlatter

9/6/22  16:30 - 18:30
Data-driven Reduced Simulation Models for Industrial Applications II
Minisymposium organized by Norbert Hosters, Daniel Wolff and Daniel Hilger

Resolving dispersion coefficients in reduced order chromatography models
Jayghosh S. Rao, Marek Behr and Eric von Lieres

Hybrid process modelling combining mechanistic equations with machine learning
Jaizl Hassan, Jayghosh Rao and Eric von Lieres

Physics-aware convolutional neural networks for computational fluid dynamics simulations
Viktor Grimm, Alexander Heinlein and Axel Klawonn

Optimized graph-based methods for subsurface flow simulations
Stein Krogstad, Øystein Klemetsdal, August Johansson and Knut-Andreas Lie

A grey box approach for online process monitoring
Lars Bogerts, Arnout Dejans, Patrick Van Rymenant, Matthias Foes and David Moens

In silico clinical trials: SILICOFCM – Coupling of physical based and data driven modeling
Nenad Filipovic
CONFERENCE PROGRAMME & TECHNICAL SESSIONS

9/6/22 16:30 - 18:30
Predictive Modelling for Multi-Physics Problems in Engineering: Methods, Algorithms and Challenges
Minisymposium organized by Andrew Buchan and Jeff Gomes

A CFD-Radiation model for the simulation of UV photoreactors for drinking water treatment (Keynote Lecture)
Liang Yang, Andrew G. Buchan and Peter Jarvis

Fuzzy logic based rapid visual screening methodology for structural damage state determination of URM buildings
Wurullah Bekas and Orsolya Kegyes-Brassai

A tensor-based geology preserving formulation for upscaling heterogeneous permeability fields
Temiloluwa A. Onimisi, Babatunde O. Lashore and Jefferson LMA. Gomes

Fluid-structure interaction simulation of a wire-wrapped tube array using overset grids
Shupei Kaneko and Shinobu Yoshimura

9/6/22 16:30 - 18:30
Multiscale Methods for Composites and Heterogeneous Materials II
Minisymposium organized by Paul Steinmann, Guillermo Etse, Daya Reddy and Osvaldo Manzoli

Imperfect interface modeling of potential and elasticity problems with thin layers: recent theoretical and computational developments
Sofia Mogilevskaya, Svetlana Baranova, Zhilin Han, Dominik Schillinger and Volodymyr Kushch

On the analysis of targeted cooling processes and resulting residual stresses
Sonia Hellebrand, Lisa Scheunemann, Dominik Brands and Jörg Schröder

Estimating stress fluctuations in polycrystals with an improved maximum entropy method
Maximilian Krause and Thomas Böhike

Local surrogate responses in Schwarz alternating method for elastic problems on random domains
Martin Drieschner, Robert Gruhlke, Yuri Petryna, Martin Eigel and Dietmar Hömberg

Multi-scale numerical investigation to predict the irradiation-induced change in engineering properties of fusion reactor materials
Salahudeen Mohamed, Rhidian Lewis and LLion Evans

18:30 - 19:00: Aperitif served (Nova Spektrum Hall B3+B4)
19:00 - 19:30: Closing remarks (Nova Spektrum Hall B3+B4)
19:30 - 20:00: Time to walk from Hall B to Hall E
20:00 - 23:00: Dinner at Nova Spektrum Hall E