15th World Congress on Computational Mechanics

WCCM
YOKOHAMA2022
APCOM

8th Asian Pacific Congress on Computational Mechanics
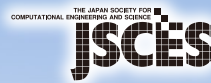
Yokohama Japan
Virtual

Congress Vision :
Pursuing the Infinite Potential of Computational Mechanics

July 31 to August 5, 2022
(Pre-Open on July 24)

Apacm   iacm   JSCES   JACM

THE JAPAN SOCIETY FOR
COMPUTATIONAL ENGINEERING AND SCIENCE

Program Book

WCCM-APCOM
YOKOHAMA2022 15th World Congress on Computational Mechanics &
8th Asian Pacific Congress on Computational Mechanics

15th World Congress on Computational Mechanics
&
8th Asian Pacific Congress on Computational Mechanics

Yokohama, Japan
Virtual

Congress vision:

Pursuing the Infinite Potential of Computational Mechanics

July 31 – August 5, 2022
(Pre-Open: July 24)

Hosting Organizations:

International Association for Computational Mechanics (IACM)

The Japan Society for Computational Engineering and Science (JSCES)

Supporting Organizations:

The Asian Pacific Association for Computational Mechanics (APACM)

Japan Association for Computational Mechanics (JACM)

15th World Congress on Computational Mechanics

WCCM
YOKOHAMA2022
APCOM

8th Asian Pacific Congress on Computational Mechanics

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Greetings from the Congress Chair

On behalf of the Local Organizing Committee, I would like to welcome you to the 15th World Congress on Computational Mechanics and the 8th Asian Pacific Congress on Computational Mechanics in 2022 (WCCM-APCOM 2022). WCCM-APCOM 2022 is organized by the International Association for Computational Mechanics (IACM) and the Asian Pacific Association for Computational Mechanics (APACM) as international societies and the Japan Society for Computational Engineering and Science (JSCES) and the Japan Association for Computational Mechanics (JACM) as local societies.

The Congress was first proposed as the normal format in Yokohama, an attractive port city near Tokyo, before the emergence of COVID-19. It must be a great and honorable event for the researchers on computational mechanics in Japan to host WCCM-APCOM since the 3rd WCCM at Chiba in 1994 and 3rd APCOM at Kyoto in 2007.

The Congress format was changed to the hybrid, in-person and online, by expecting the recovery from the worldwide pandemic. However, the situation has been still uncertain, particularly for the international border control which should be free as possible to invite the participants from the world. Finally, we decided to change the Congress format to the fully virtual. Meeting in-person has been very important, I noticed it again during the pandemic, to transfer the spirit as well as the knowledge of Computational Mechanics to the younger researchers. Unfortunately, such opportunity is not possible in this Congress but I expect it in the next one.

Nevertheless, the researchers who submitted the abstracts for presentation, the mini-symposium organizers, the plenary and semi-plenary lecturers and the sponsors keep contribution to the Congress. I would like to say the highest appreciation to all of them.

Special thanks go to Yokohama Convention & Visitors Bureau and Japan National Tourism Organization for their kind support. Pacifico Yokohama is acknowledged for their flexible attitude to cope with unpredictable conditions, though, eventually and unfortunately, the Congress format has been changed to fully virtual.

Seiichi Koshizuka

The Congress Chair

Greetings from the President of IACM

Dear IACM Community,

It is a great pleasure to welcome you to the 15th World Congress on Computational Mechanics (WCCM), which, in this edition, joints with the 8th Asian-Pacific Congress on Computational Mechanics (APCOM).

As we write these words, we are seeing the first indicators showing that the pandemic begins to recede and, in some months, it will hopefully be behind most of us. Of course, leaving much to do and to rebuild what has been broken or lost. Your safety has been our prime concern in taking the decision of going virtual. International health and travel restrictions to Japan were at the core of this decision. Moreover, we have now a solid experience, proper feedback, and excellent results with the organization of virtual events in our community. I am convinced that we will find in the future plenty of occasions to gather in Yokohama.

We are confident of the success and the quality of this virtual event because of the commitment and professionalism of the organizing team. In fact, I take this opportunity to wholeheartedly thank the Chair of the Congress, Professor Seiichi Koshizuka, and the Secretary General of the Congress, Professor Kenjiro Terada, as well as their local team and IACM staff for the service and dedication in putting together an excellent congress with a program full of timely and challenging topics covering all topics in Computational Science and Engineering. It is recomforting to observe how classic topics still prevail and at the same time we embrace new subjects from neighboring disciplines. In fact, classic and new disciplines are motivated, as usual in our discipline, from scientific and industrial relevant problems, which again allows us to advance knowledge in societal pertinent challenges. This cross-fertilization between fields of knowledge has always been at the core of our community.

This 15th edition of WCCM coincides with the 40th Anniversary of the IACM. We tend to overestimate what we can do in a week, but at the same time, we always underestimate what we can achieve over four long decades of research and scientific meetings in computational mechanics. The results are patent. An amazing journey, one that would not have been possible without the enthusiasm and commitment of our entire community, which showed the ambition and boldness to step further, to climb higher. This is a collective achievement of the entire computational mechanics community. Actually, we are proud to count with all your support to showcase the frontier research in our field in this major international gathering.

I wish you all an unforgettable scientific event!

Yours sincerely,

Antonio Huerta
The President of IACM

Greetings from the President of APACM

Welcome all to participate in WCCM-APCOM2022 Yokohama in a virtual format. I am very pleased to hold this important and exciting scientific event in the field of computational mechanics with your participation from all over the world. Although this joint Congress is finally decided to be held in a fully virtual format due to the severe influence of COVID-19 Pandemic raging since early 2020, I am very proud of this event being successfully held with a great and dedicated organization of local organizing members in Japan, i.e. JSCES (The Japan Society of Computational Engineering and Science) and JACM (The Japan Association for Computational Mechanics) as well as the IACM (The International Association for Computational Mechanics) and the APACM (Asian Pacific Association for Computational Mechanics). I specially thank to all members of the organizing team lead by Professor Genki Yagawa (Honorary Congress Chair), Professor Seiichi Koshizuka (Chair), Professor Kazuo Kashiyama (Co-chair), Professor Marie Oshima (Co-chair), and Professor Kenjiro Terada (Secretary General).

The APACM was established in 1999, comprising of the national and regional associations for computational mechanics in the Asia-Australian region, which is one of the three continental associations affiliated with IACM. At present, there are 11 member associations affiliated in APACM. These includes China, Japan, Korea, Australia, Singapore, Taiwan, Hong Kong, India, Malaysia, Thailand and Vietnam. The APACM organizes the Asian Pacific Congress on Computational Mechanics (APCOM) in different countries of the region at the interval of three years. The first Congress was held in Sydney, Australia (2001), the second in Beijing, China (2004) in conjunction with WCCM6, the third in Kyoto, Japan (2007), the fourth in Sydney, Australia (2010) in conjunction with WCCM9, the fifth in Singapore (2013), the sixth in Seoul, Korea (2016) in conjunction with WCCM12, and the seventh in Taipei, Taiwan (2019). The eighth is now holding in Yokohama, Japan in conjunction with WCCM15.

I wish all the participants to enjoy the Congress, and to work together towards our better future.

Shinobu Yoshimura
The President of APACM

Greetings from the President of JSCES

On behalf of the Japan Society for Computational Engineering and Science (JSCES), it is a great pleasure for me to welcome you to the 15th World Congress on Computational Mechanics & 8th Asian Pacific Congress on Computational Mechanics (WCCM XV & APCOM VIII) which is organized in a virtual format.

The Japan Society for Computational Engineering and Science (JSCES) was established in 1995, after the success of the 3rd World Congress on Computational Mechanics (WCCM III, Chiba) held in 1994, as an academic organization that pursues development and progress of computational engineering and computational mechanics. Historically, this WCCM XV & APCOM VIII Congress will be a very memorable one also for JSCES.

In the coming era, circumstances surrounding our society and academic societies are becoming more complicated with rapid progress of new information technology and cutting-edge science. One of the trends is major movements such as SDGs, AI, and IoT, and technological changes and evolution. Computational engineering and mechanics are applied in various fields as useful technologies and methods, and also as a way of thinking, in the cyber space of the CPS (Cyber-Physical System) field in cooperation with mathematical information science and data analysis. As seen in the recent unpredictable phenomena such as COVID-19, a computational engineering approach that takes advantage of the characteristics of analysis and synthesis may act greatly in the relationship between humans, society, nature, information and mechanical systems. It may become a driving force to solve problems and create new values. On the other hand, it is important to go back to the basics and further promote the deepening of expertise based on the elucidation of complex phenomena, to act against the trend of excessive information analysis.

In this background, the main objective of the WCCM Congress series is to provide a forum for presentation and discussion of state-of-the-art advances in computational methods in applied sciences and engineering, including basic methodologies, scientific developments and industrial applications, and to serve as a platform for establishing links between research groups of academia and industry with common as well as complementary activities. I hope that new interdisciplinary awareness and knowledge would be born in this congress.

We remain devoted to providing you with the best cutting-edge content in an engaging format. We thank you again for your continued support and look forward to welcoming you to our virtual WCCM XV & APCOM VIII !

Naoya Sasaki
The President of JSCES

Greetings from the President of JACM

On behalf of the members of the Japan Association for Computational Mechanics (JACM), I would like to welcome you to the 15th World Congress on Computational Mechanics & 8th Asian Pacific Congress on Computational Mechanics (WCCM-APCOM 2022). As the president of the supporting organization, I am very pleased to have all of you in what is considered to be the greatest event in the field of computational mechanics.

I have had great experiences attending WCCM and APCOM in previous years. They have been held in Beijing, Sydney, Sao Paulo, Barcelona, Seoul, New York, Taipei, Singapore and many other cities. At each event, I have enjoyed meeting new and old friends and colleagues, and discovering new trends in the field of computational mechanics. WCCM and APCOM are viewed as the world's highest level conferences in this field, and technical presentations in these past events have been very challenging for me. It is here that the finest researchers and engineers gather together to share the most cutting-edge knowledge and technology in the field of computational mechanics. As the president of the supporting organization, JACM, my hope is for young researchers especially to experience similar feelings as I have had in the past, and to be inspired and motivated to propel forward the advancement of their field as well as their own development as researchers and engineers. I am sure that WCCM-APCOM 2022 will be an event to facilitate such growth.

JACM is one of the supporting organizations of WCCM-APCOM 2022. JACM is an affiliated organization of the International Association for Computational Mechanics (IACM) and loosely brings together academic societies related to computational mechanics in Japan. The major function of JACM is to distribute information about IACM-related international conferences among researchers and engineers in Japan through these academic societies. Currently, 29 societies participate JACM. JACM encourages researchers and engineers to participate in IACM events and to exchange ideas with their international peers. The members of JACM were very much looking forward to having the WCCM-APCOM, the largest event of both IACM and the Asian Pacific Association for Computation Mechanics (APACM), in Japan. We were so excited to host researchers and engineers from around the world and to invite our friends and colleagues to the event, as WCCM-APCOM 2022 was originally planned to be held in Yokohama, Japan.

Although the Congress is being held as a virtual event due to the pandemic, the technical content is as planned for the face-to-face format. There are about 3000 technical presentations along with plenary and semi-plenary lectures. The presentations and lectures will cover a wide range of topics related to the field of computational mechanics. These include traditional fields, such as solid mechanics, structural mechanics, fracture mechanics, fluid dynamics, and thermodynamics, along with relatively newer subjects such as machine learning. I hope that all the participants of WCCM-APCOM 2022 have great experiences and fruitful exchanges.

Hiroshi Okada
The President of JACM

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(in alphabetical order)

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Video-On-Demand (VOD)

Information about the Abstracts and Videos with Q&A feature on the VOD site is provided below. Instruction on how to access and enjoy the VOD site will be shown in the homepage of WCCM-APCOM 2022.

Published date of Abstracts

Published date of Abstracts: July 31

Viewing period and published date of Videos

Video-viewing period with Q&A function: July 24 to August 5

Video-viewing period without Q&A function: August 6 to September 30

Published date of Videos: July 31

Presentation time (Duration of video)

I.   Plenary and semi-plenary lectures: Within 45 min

II. Keynote presentation: 40 min

III. Regular presentation: 20 min

About Q&A

The VOD system has a Q&A function such that the author is notified soon via e-mail when comments are received. This function contributes to make a smooth and fruitful discussion in the VOD site.

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Live Discussion

Live Discussion Program Overview

An overview of the live discussion program for the plenary/semi-plenary (PL/SPL) lectures and the mini-symposia (MS) is provided below. There will be no on-time technical program held during the congress. Assuming that attendees have viewed videos in advance, PL/SPL and MS organizers will facilitate a live discussion session on time. The links of these live discussions will be posted on the video-viewing (VOD: video-on-demand) system.

JST (Yokohama)	CEST (Paris)	EDT (NY)	PDT (LA)	Aug 1 (Mon)	Aug 2 (Tue)	Aug 3 (Wed)	Aug 4 (Thu)	Aug 5 (Fri)
8:00–9:00	1:00–2:00	19:00–20:00 [–1 day]	16:00–17:00 [–1 day]	Opening/ Award Ceremonies				
9:00–9:20	2:00–2:20	20:00–20:20 [–1 day]	17:00–17:20 [–1 day]	PL: A Matsuo			PL: CW Lim	PL: C Farhat
9:30–9:50	2:30–2:50	20:30–20:50 [–1 day]	17:30–17:50 [–1 day]	SPL (3 parallel): WK Liu E Silva Z Liu			SPL (3 parallel): GR Liu SJ Shin YT Gu	SPL (2 parallel): E Kuhl M Liu
10:00–12:00	3:00–5:00	21:00–23:00 [–1 day]	18:00–20:00 [–1 day]	MS live discussion	MS live discussion	MS live discussion	MS live discussion	MS live discussion
12:30–13:00	5:30–6:00	23:30–0:00 [–1 day]	20:30–21:00 [–1 day]					Closing Ceremony
16:00–16:20	9:00–9:20	3:00–3:20	0:00–0:20	PL: M Oshima	PL: I Arias		PL: R de Borst	
16:30–16:50	9:30–9:50	3:30–3:50	0:30–0:50	SPL (3 parallel): P Wriggers F Chinesta D Chen	SPL (2 parallel): M Kaliske S Mittal		SPL (2 parallel): A Reali Y Wada	
17:00–19:00	10:00–12:00	4:00–6:00	1:00–3:00	MS live discussion	MS live discussion	MS live discussion	MS live discussion	
23:00–1:00	16:00–18:00	10:00–12:00	7:00–9:00			Women's Networking Event		
20:00–26:00	13:00–19:00	7:00–13:00	4:00–10:00	MS 1001				
23:00–24:00	16:00–17:00	10:00–11:00	7:00–8:00			MS 0503		
20:00–22:00	13:00–15:00	7:00–9:00	4:00–6:00				MS 1711	
0:00–2:00	17:00–19:00 [–1 day]	11:00–13:00 [–1 day]	8:00–10:00 [–1 day]					MS 0716

Live Discussion Program for Plenary Lectures (PL) and Semi-Plenary Lectures (SPL)

JST August 1 (Monday) AM

JST (Yokohama)	CEST (Paris)	EDT (NY)	PDT (LA)	Speaker	Chairpersons	Webinar Name
8:00–9:00	1:00–2:00	19:00–20:00 [–1 day]	16:00–17:00 [–1 day]	Opening/ Award Ceremonies		Room101A
9:00–9:20	2:00–2:20	20:00–20:20 [–1 day]	17:00–17:20 [–1 day]	PL: Akiko Matsuo	Seiichi Koshizuka / Gretar Tryggvason	
9:30–9:50	2:30–2:50	20:30–20:50 [–1 day]	17:30–17:50 [–1 day]	SPL: Wing Kam Liu	Moubin Liu / Kenjiro Terada	
				SPL: Emilio Silva	SangJoon Shin / Shinji Nishiwaki	Room201A
				SPL: Zishun Liu	Gui-Rong Liu / Akiyuki Takahashi	Room301A

JST August 1 (Monday) PM

JST (Yokohama)	CEST (Paris)	EDT (NY)	PDT (LA)	Speaker	Chairpersons	Webinar Name
16:00–16:20	9:00–9:20	3:00–3:20	0:00–0:20	PL: Marie Oshima	Peter Wriggers / Kazuo Kashiyama	Room401P
16:30–16:50	9:30–9:50	3:30–3:50	0:30–0:50	SPL: Peter Wriggers	Makoto Tsubokura / Dai Okumura	
				SPL: Francisco Chinesta	Alessandro Reali / Naoki Takano	Room501P
				SPL: Chuin-Shan (David) Chen	Daigoro Isobe / Haeng Ki Lee	Room601P

JST August 2 (Tuesday) PM

JST (Yokohama)	CEST (Paris)	EDT (NY)	PDT (LA)	Speaker	Chairpersons	Webinar Name
16:00-16:20	9:00-9:20	3:00-3:20	0:00-0:20	PL: Irene Arias	René de Borst / Marie Oshima	Room402P
16:30-16:50	9:30-9:50	3:30-3:50	0:30-0:50	SPL: Michael Kaliske	Yoshitaka Wada / Toshio Nagashima	
				SPL: Sanjay Mittal	Takayuki Aoki / Minoru Shirazaki	Room502P

JST August 4 (Thursday) AM

JST (Yokohama)	CEST (Paris)	EDT (NY)	PDT (LA)	Speaker	Chairpersons	Webinar Name
9:00–9:20	2:00–2:20	20:00–20:20 [–1 day]	17:00–17:20 [–1 day]	PL: C.W. Lim	Charbel Farhat / Hiroshi Okada	Room104A
9:30–9:50	2:30–2:50	20:30–20:50 [–1 day]	17:30–17:50 [–1 day]	SPL: Gui-Rong Liu	Zishun Liu / Tohru Hirano	
				SPL: SangJoon Shin	Emilio Silva / Mitsuteru Asai	Room204A
				SPL: YuanTong Gu	Ellen Kuhl / Tomohiro Takaki	Room304A

Live Discussion

JST August 4 (Thursday) PM

JST (Yokohama)	CEST (Paris)	EDT (NY)	PDT (LA)	Speaker	Chairpersons	Webinar Name
16:00–16:20	9:00–9:20	3:00–3:20	0:00–0:20	PL: René de Borst	Irene Arias Chuin-Shan (David) Chen	Room404P
16:30–16:50	9:30–9:50	3:30–3:50	0:30–0:50	SPL: Alessandro Reali	Francisco Chinesta Ryuji Shioya	
				SPL: Yoshitaka Wada	Michael Kaliske Masataka Koishi	Room504P

JST August 5 (Friday) AM

JST (Yokohama)	CEST (Paris)	EDT (NY)	PDT (LA)	Speaker	Chairpersons	Webinar Name
9:00–9:20	2:00–2:20	20:00–20:20 [−1 day]	17:00–17:20 [−1 day]	PL: Charbel Farhat	C.W. Lim Shinobu Yoshimura	Room105A
9:30–9:50	2:30–2:50	20:30–20:50 [−1 day]	17:30–17:50 [−1 day]	SPL: Ellen Kuhl	YuanTong Gu Junji Kato	
				SPL: Moubin Liu	Akiko Matsuo Hiroshi Okuda	Room205A

JST August 5 (Friday) PM

JST (Yokohama)	CEST (Paris)	EDT (NY)	PDT (LA)	Speaker	Chairpersons	Webinar Name
12:30–13:00	5:30–6:00	23:30–0:00 [−1 day]	20:30–21:00 [−1 day]	Closing Ceremony		Room405P

Live Discussion

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Organization

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Q. Li (Australia)
Z. Liu (China)
C.W. Lim (Hong Kong)
C.A. Lin (Taiwan)
J.W.Z. Lu (Hong Kong)
T. Łodygowski (Poland)
P.R. Maciel Lyra (Brazil)
S. Marfia (Italy)
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J. Matsumoto (Japan)
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G. Meschke (Germany)
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N. Miyazaki (Japan)
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F. Montáns (Spain)
N. Moraga Benavides (Chile)
J. Murín (Slovakia)
T. Münz (Germany)
T. Nagashima (Japan)
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S. Nishiwaki (Japan)
T. Nomura (Japan)
S. Obayashi (Japan)
J.T. Oden (USA)
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S. Okazawa (Japan)

H. Okuda (Japan)

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J. Orkisz (Poland)

M. Oshima (Japan)

J. Pamin (Poland)

M. Papadrakakis (Greece)

H.S. Park (USA)

C. Pearce (UK)

J.C. Pereira (Portugal)

C.B. Pina (Portugal)

J.P. Ponthot (Belgium)

S. Prudhomme (Canada)

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A. Reali (Italy)

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N. Sasaki (Japan)

J. Schröder (Germany)

R. Sevilla (United Kingdom)

S. Skatulla (South Africa)

L.J. Sluys (Netherlands)

C. Song (Australia)

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G.E. Stavroulakis (Greece)

G. Steven (Australia)

J. Stewart (USA)

N. Sukumar (USA)

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M.N. Tamin (Malaysia)

V.B.C. Tan (Singapore)

J. Teixeira de Freitas (Portugal)

K. Terada (Japan)

T. Tezduyar (USA)

R. Tian (China)

G.J. van Heijst (Netherlands)

W.A. Wall (Germany)

D. Wang (China)

H. Watanabe (Japan)

M. Xie (Australia)

T. Yabe (Japan)

G. Yagawa (Japan)

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Y. Zheng (China)

T. Zohdi (USA)

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D. Isobe (Technical Program Chair)

(1) Data-Scientific Computational Mechanics

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J.P. Yang (Taiwan)

Z. Yosibash (Israel)

(6) Scientific High-performance Computing

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K. Inagaki (Japan)

D. Littlewood (USA)

N. Morita (Japan)

H. Tufo (USA)

(7) Safety & Environmental Engineering

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S. Cao (China)	S. Iizuka (Japan)	

(8) Computational Mechanics in Industrial Liaison Activities

T. Hirano (Leader, Japan)	H. Kadowaki (Japan)	N. Sasaki (Japan)
N. Gauger (Germany)	M. Maggiore (Belgium)	
Y. Ito (Japan)	T. Nagai (Japan)	

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R. Higuchi	K. Terada	

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Congress Secretariat

Japan Convention Services, Inc.
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Plenary and Semi-Plenary Lectures

Plenary Lectures

Designing flexoelectric metamaterials through computational strain gradient engineering

Irene Arias

Lacan, Universitat Politècnica de Catalunya, Spain

Fracture and flow in porous media: a two-scale approach and spline-based discretisation

René de Borst

University of Sheffield, UK

Computational mechanics-based digital twin for model predictive control of autonomous UAV landing in adverse conditions

Charbel Farhat

Stanford University, USA

From engineered metastructures to natural seismic metamaterials: theory, computational aspects and experiments

C.W. Lim

City University of Hong Kong, Hong Kong

Development of new rocket propulsion system "Rotating Detonation Engine"

Akiko Matsuo

Keio University, Japan

Computational hemodynamics for clinical applications - crossroad between patient-specific simulation and machine-learning techniques

Marie Oshima

The University of Tokyo, Japan

Semi-Plenary Lectures
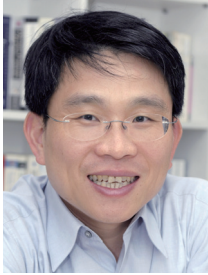
Deep materials modeling and design

Chuin-Shan (David) Chen

National Taiwan University, Taiwan

Empowering data-informed engineering from smarter data, sensing and hybrid modelling

Francisco Chinesta

ENSAM Institute of Technology, France

Machine-learning based computational mechanics as a powerful tool for engineering and science

YuanTong Gu

Queensland University of Technology, Australia

Discrete crack models in regularized fracture mechanics for mesh-based and mesh-free methods

Michael Kaliske

TU Dresden, Germany

Opportunities for Machine Learning in Computational Mechanics

Ellen Kuhl

Stanford University, USA

On law- and data-based methods

Gui-Rong Liu

University of Cincinnati, USA

A semi-resolved CFD-DEM approach for particulate flows with thermal convection

Moubin Liu

Peking University, China

Hierarchical Deep Learning Neural Network (HiDeNN)-FEM-AI for process design and performance prediction of material systems

Wing Kam Liu

Northwestern University, USA

Recent advances of constitutive models of soft smart materials - from molecular, network scales to continuum scale

Zishun Liu

Xi'an Jiaotong University, China / National University of Singapore, Singapore

Wings at low Reynolds numbers and lifting line theory

Sanjay Mittal

Indian Institute of Technology Kanpur, India

Isogeometric analysis: some recent advances and applications

Alessandro Reali

University of Pavia, Italy

Parametric model order reduction for fluid and structure objects

SangJoon Shin

Seoul National University, Korea

A Topology Optimization Approach Towards Fluid Flow Design Problems

Emilio Silva

Polytechnic School of University of São Paulo, Brazil

Prediction of fatigue crack propagation using effective regularization techniques for regression problems

Yoshitaka Wada

Kindai University, Japan

Virtual elements in engineering sciences

Peter Wriggers

Leibniz University Hannover, Germany

Social Events

Opening Ceremony (Aug. 1)

JST (Yokohama): 8:00–8:10

CEST (Paris): 1:00–1:10

EDT (NY): 19:00–19:10 [–1 day]

PDT (LA): 16:00–16:10 [–1 day]

- Welcome addresses
  - Congress Chair - Seiichi Koshizuka
  - IACM President - Antonio Huerta
  - APACM President - Shinobu Yoshimura

Award Ceremonies (Aug. 1)

JST (Yokohama): 8:15–9:00

CEST (Paris): 1:15–2:00

EDT (NY): 19:15–20:00 [–1 day]

PDT (LA): 16:15–17:00 [–1 day]

- APACM Award Ceremony
- IACM Award Ceremony

Closing Ceremony (Aug. 5)

JST (Yokohama): 12:30–13:00

CEST (Paris): 5:30–6:00

EDT (NY): 23:30–0:00 [–1 day]

PDT (LA): 21:30–22:00 [–1 day]

- Closing remarks
  - IACM President
  - New IACM President
  - New APACM President
- Announcement of next conferences
  - USNCCM 2023
  - WCCM-PANACM 2024
  - APCOM 2025
- Congress Chair final remark

Social Events

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Side Events

Short Courses (IACM)

- Advanced Parallel Programming in C^{++}
- Machine Learning for Solid Mechanics

Women's Networking Event (FRC: IACM Female Researchers Chapter) (Aug. 3)

JST (Yokohama): 23:00–1:00

CEST (Paris): 16:00–18:00

EDT (NY): 10:00–12:00

PDT (LA): 7:00–9:00

- Welcoming messages
- Panel discussion
- Announcement of the WCCM-FRC Merit-Based award recipients
- Communication exchange for developing networks among attendees

Side Events

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List of Minisymposia

0100-Fracture, Damage and Failure Mechanics

MS0101 ADVANCED MATERIALS: COMPUTATIONAL ANALYSIS OF PROPERTIES AND PERFORMANCE
Vadim V. Silberschmidt, Valery P. Matveenko

MS0103 Composite materials under crash and impact loading
Michael May

MS0104 NUMERICAL SIMULATION AND EXPERIMENT OF CATASTROPHIC FAILURE MECHANICS
Tiantang Yu, Qingwen Ren

MS0105 Computational Damage & Fracture Modeling in Multiphysics Framework
Mostafa Mobasher, Haim Waisman, C. Armando Duarte, Patrice Longère, Sundararajan Natarajan

MS0106 Crack propagation in multiphysics problems
Ugo Galvanetto, Bernhard A. Schrefler

MS0107 Peridynamic Theory and Multiscale Methods for Complex Material Behavior
Patrick Diehl, Pablo Seleson, Fei Han, Erkan Oterkus, Gilles Lubineau

MS0108 Recent advances in computational modeling of damage and fracture
Leong Hien Poh, Ron Peerlings, Tinh Quoc Bui, John Dolbow, Amine Benzerga

MS0109 Recent Advances in Modeling and Simulating Extreme Events
Yan Liu, Xiong Zhang, Zhen Chen, Dongdong Wang, Fei Xu, Cheng Wang

MS0110 CURRENT TRENDS IN PHASE-FIELD MODELING AND COMPUTATION OF FRACTURE & FATIGUE
Fadi Aldakheel, Ralf Müller, Laura De Lorenzis

MS0112 DUCTILITY ENHANCEMENT: ADVANCES IN EXPERIMENTAL AND COMPUTATIONAL MECHANICS
Kaan Inal, Toshihiko Kuwabara, Dirk Mohr, Jidong Kang

MS0113 Damage and Failure of Composite Materials and Structures
Stephen Hallett, Joris Remmers, Pedro Camanho

MS0114 Computational Modelling of Self-healing Composite Materials and Structures
Ivica Smojver, Vassilis Kostopoulos

MS0115 Plastic instability and fracture in ductile materials
Shmuel Osovski, Ankit Srivastava, José A. Rodríguez-Martínez

MS0116 Multi-stage Failure Simulations
Mao Kurumatani, Kyoungsoo Park, Kenjiro Terada, Norio Takeuchi, Rene de Borst

MS0117 Advancement of computational fracture mechanics applications
Yoshitaka Wada, Hiroshi Okada, Toshio Nagashima, Xueling Fan, Liu Zhanli

MS0118 Computational analysis of fiber reinforced composites
Vincent Tan, Ryo Higuchi, Jun Koyanagi, Tong Earn Tay

MS0119 Ductile-Fracture Modeling and Simulation
Kazutake Komori

MS0120 Peridynamics and Nonlocal Theories for Fracture Modelling: Recent Developments and Their Applications
Satoyuki Tanaka, Tinh Bui Quoc, Selda Oterkus, Erkan Oterkus, Erdogan Madenci

WCCM-APCOM   YOKOHAMA2022   15th World Congress on Computational Mechanics &
8th Asian Pacific Congress on Computational Mechanics

List of Minisymposia

MS0121   **Recent Advances in Computational Fracture Mechanics for Subsurface Applications**

Juan Michael Sargado, Michael Welch, Inga Berre

MS0122   **Fracture, Damage and Failure Mechanics of Smart and Active Materials**

Sergey Kozinov, Bai-Xiang Xu, Andreas Ricoeur, John Huber, Hongjun Yu

MS0123   **Computational Fracture Modeling in Heterogeneous Materials – Recent Advances and Future Challenges**

Paras Kumar, Dhananjay Phansalkar, Julia Mergheim, Sigrid Leyendecker, Paul Steinmann

MS0124   **Modeling of concrete in an Experimental-Virtual-Lab**

Jörg Schröder, Steffen Anders, Dominik Brands, Laura de Lorenzis, Peter Wriggers,
Michael Kaliske, Ken Terada

0200-Advanced Discretization Techniques

MS0201   **ADVANCES IN THE SCALED BOUNDARY FINITE ELEMENT METHOD AND OTHER SEMI-ANALYTICAL & NUMERICAL TECHNIQUES**

Sascha Eisentraeger, Hauke Gravenkamp, Ean Tat Ooi, Sundararajan Natarajan, Carolin Birk,
Sven Klinkel, Chongmin Song

MS0202   **Virtual Element and related polygonal methods in solid and fluid mechanics applica-tions**

Peter Wriggers, Edoardo Artioli, Lourenco Beirão da Veiga

MS0203   **Advances in High-Order Methods for Computational Fluid Dynamics**

Freddie Witherden, Yoshiaki Abe, Peter Vincent

MS0204   **Recent advances in immersed boundary and fictitious domain methods**

Alexander Düster, Oriol Colomés, Sascha Eisenträger, Thomas-Peter Fries, Mats Larson, Mario Ricchiuto,
Juan José Rodenas, Riccardo Rossi, Andreas Schröder, Guglielmo Scovazzi, Ernst Rank

MS0205   **Particle-based methods: advances and applications in DEM, PFEM, SPH, MPM, MPS and others**

Sergio Idelsohn, Eugenio Oñate, Eduardo M.B. Campello, Tarek I. Zohdi, Peter Wriggers

MS0206   **Industrial Applications of IGA**

Hugo Casquero, Xiaodong Wei, Emily Johnson, Ming-Chen Hsu, Jessica Zhang,
Matt Sederberg, Attila Nagy

MS0207   **Special Methods in Computational Fluid Mechanics**

Matthias Kirchhart, Abhinav Jha

MS0208   **Particle-based methods for computational multi-physics and multi-scale fluid dynamics**

Zhe Ji, Lin Fu, Nikolaus Adams

MS0209   **Current Trends and Advances in Coupled Simulations and Enriched Finite Element Methods**

Olivier Allix, Alejandro Aragon, Daniel Dias-da-Costa, Armando Duarte

MS0210   **Mesh-free particle methods for multi-physics problems**

Ahmad Shakibaeinia, Abbas Khayyer

MS0211   **Isogeometric Spline Techniques on Complex Geometries**

Xiaodong Wei, Deepesh Toshniwal, Hugo Casquero, Yongjie Zhang

MS0213   **Advances and Applications of Collocation Methods: Meshfree, IGA, Machine Learning for PDEs**

Pratik Suchde, Isabel Michel, Elena Atroshchenko, Stéphane P.A. Bordas

MS0214   **CAD-based discretization methods**

Pablo Antolin, Robin Bouclier, Rafael Vázquez Hernández, Thomas Elguedj, Annalisa Buffa

MS0215   Locking, Stability and Robustness of Non-linear Finite Elements for Large Deformation Problems
Simon Bieber, Manfred Bischoff, Robin Pfefferkorn, Peter Betsch, Alessandro Reali, Ferdinando Auricchio

MS0217   HIGH ORDER NUMERICAL METHODS AND HIGH ORDER MESH GENERATION
Bo Liu, Xuefeng Zhu, Yingjun Wang, Yujie Guo

0300-Multiscale and Multiphysics Systems

MS0301   Mathematical and Mechanical Aspects of Mixed-Dimensional Coupling Problems
Alexander Popp, Barbara Wohlmuth, Jan Martin Nordbotten

MS0302   Quasistatic Electromechanics: Methods and Applications
James Carleton, Wen Dong

MS0303   Computational interface mechanics in coupled problems
K. C. Park, C. A. Felippa, Roger Ohayon, Hermann Matthies, José González, Jin-Gyun Kim, Radek Kolman

MS0304   Multi-scale and machine learning-based modeling methods for optimization and design of composites
Alfonso Pagani, Marco Petrolo, Maryiam Shakiba, Chao Zhang

MS0305   MULTIPHYSICS MECHANICS & TRANSPORT PHENOMENA IN SOFT MATERIALS & THEIR INTERFACES: THEORY, SIMULATIONS, & EXPERIMENTS
HUA LI, BERKIN DORTDIVANLIOGLU, KEK BOON GOH, Eric C.S. Ngin

MS0306   MULTISCALE COMPUTATIONAL HOMOGENIZATION FOR BRIDGING SCALES IN THE MECHANICS AND PHYSICS OF COMPLEX MATERIALS
Julien Yvonnet, Kenjiro Terada, Peter Wriggers, Marc Geers, Karel Matous

MS0307   Multi-scale and Multi-physics Computations in Fluids and Solids
Yozo Mikata, Glaucio Paulino

MS0308   Computations in mechanics of metamaterials
Bilen Emek Abali, Ivan Giorgio, Luca Placidi

MS0310   Advances in phase-field modelling and simulation
Akinori Yamanaka, Tomohiro Takaki, Yuhki Tsukada

MS0311   Performance analysis and degradation studies of photovoltaic modules
Pattabhi Ramaiah Budarapu, Naresh Varma Datla, Marco Paggi

MS0312   MULTISCALE COUPLING METHODS FOR MODELING AND SIMULATION OF MATERIALS
Hao Wang, Huajie Chen, Lei Zhang

MS0313   Novel Modeling Strategies for Mechatronic Systems
Florian Toth, Manfred Kaltenbacher

MS0314   3D MODELING OF BUILDING MATERIALS: GEOMETRIC AND CONSTITUTIVE ISSUES
Beatrice Pomaro, Gianluca Mazzucco

MS0315   Computation for Energy Storage
Wei Lu

MS0318   Leveraging Reduced Descriptions to Accelerate Kinetic Simulations
Lee Ricketson, William Taitano

MS0319   Integrating Data Science and Multiscale Methods for Multiphysics Applications
Tim Wildey, Graham Harper

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List of Minisymposia

MS0321 **Computational Multiscale Method of Solids and Structures**
Shaoqiang Tang, Shan Tang, Zifeng Yuan

MS0322 **Metamaterials and metasurfaces with odd physical properties**
Yunche Wang, Yu-Chi Su

MS0323 **Multiscale modelling of packing and flow of granular materials**
Zongyan Zhou, Shibo Kuang, Shunying Ji, Qiang Zhou, Xizhong An, Mikio Sakai, Kun Luo

MS0324 **Multiscale and Multiphysics Modelling of the Structural and Mechanical Properties of Energy Storage Materials**
Chih-Hung Chen, Chun-wei Pao

MS0325 **Multiphase flows: experiments, simulations, and modeling**
Fu-Ling Yang, Shu-San Hsiau

MS0326 **Multiscale Procedures in Composites and Heterogeneous Materials**
Paul Steinmann, Guillermo Etse, Daya Reddy, Osvaldo Manzoli

MS0327 **Multiscale Computational Approach and Informatics of Complex Structures and Advanced Materials**
Maenghyo Cho, Seunghwa Yang, Hyunseong Shin

MS0328 **Fundamental numerical methods towards accurate, efficient and practical simulations in industrial, environmental and biological applications**
Satoshi Ii, Ryosuke Akoh, Chungang Chen, Xingliang Li

MS0329 **Multi-scale modelling of generalised continua and metamaterials**
Igor A. Rodrigues Lopes, Francisco M. Andrade Pires, Eduardo de Souza Neto

0400-Biomechanics and Mechanobiology

MS0401 **Computational modelling and machine learning in biomechanics and biomedical engineering**
Chi Wei Ong, Fangsen Cui, Hwa Liang Leo

MS0402 **COMPUTATIONAL BIOMEDICINE AND BIOMECHANICS**
Maxim Solovchuk, Tzyy-Leng Horng

MS0403 **Molecular and Cellular Biomechanics**
Wonmuk Hwang, Mohammad Mofrad

MS0404 **COMPUTATIONAL BIOMECHANICS: ADVANCED METHODS AND EMERGING AREAS**
Alessio Gizzi, Daniel E Hurtado, Michele Marino, Christian J Cyron

MS0405 **Computational Biomechanics and Biomimetics of Flapping Flight**
Daisuke Ishihara, Hao Liu, Shinobu Yoshimura

MS0406 **Female pelvic floor biomechanics**
Elisabete Silva, Luyun Chen

MS0407 **Multiscale Modeling and Machine Learning in Biomechanics**
Yaling Liu, Lucy Zhang, Ying Li, Jianxun Wang

MS0408 **Modelling and simulation of thermo-mechanical effects in excitable tissues**
Ricardo Ruiz Baier, Alessio Gizzi, Leo Cheng, Vijay Rajagopal

MS0409 **Multiphysics and Data-driven Modeling for Cardiovascular Biomedicine**
Debanjan Mukherjee, Adarsh Krishnamurthy, Ming-Chen Hsu

MS0410 Computational Simulation and Prediction of Injury due to Blast Exposures, and Blunt and Ballistic Impacts
Gary Tan, Raj Gupta, Amit Bagchi

MS0411 Computational mechanobiology of musculoskeletal tissues
Pascal Buenzli, Junning Chen, Hanna Isaksson, Richard Weinkamer

MS0412 Modeling and simulation of biological cells
Luoding Zhu, Jared Barber

MS0413 ADVANCES IN COMPUTATIONAL BIOMECHANICS AND MECHANIOBIOLOGY
David Pierce, Corey Neu, René Van Donkelaar

MS0414 Exploring brain mechanics
Silvia Budday, Kristian Franze, Jochen Guck, Paul Steinmann

MS0415 Spatial Mechanomics: Tools, methods, and results related to material heterogeneity in biomechanics
Emma Lejeune, Manuel Rausch, Adrian Buganza Tepole, Johannes Weickenmeier

MS0416 Imaging-informed computational modeling in medicine
Rafael Grytz, Jessica Zhang, Michael Girard, Ian Sigal

MS0417 Computational multiscale modeling in biomechanics
Li-Wei Liu, Chia-Ching Chou, Shu-Wei Chang

MS0418 ADVANCES IN CHARACTERIZATION AND MODELING OF BIOLOGICAL SOFT TISSUES
Tien-tuan Dao, Marie-Christine Ho Ba Tho

MS0420 Modeling of the cardiovascular and cerebral system with application to clinical medicine
Masanori Nakamura, Makoto Ohta, Marie Oshima, Juan Cebral, Anne Robertson, Khalid Saqr

MS0421 Musculoskeletal Biomechanics
Renate Sachse, Elisabeth Jensen, Rainer Burgkart, Sami Haddadin, Oliver Röhrle, Wolfgang A. Wall

MS0422 Computational Continuum Biomechanics
Tim Ricken, Oliver Röhrle, Silvia Budday

MS0423 Multiscale biofluid mechanics: from cells to organs
Ken-ichi Tsubota, Ming Dao, Toru Hyakutake, Xiaobo Gong

MS0424 Computational Mechanics and Mechanobiology of the Shoulder Joint
Ara Nazarian, Joseph DeAngelis

MS0425 Musculoskeletal Modeling Across the Lifespan: Biomechanics from Young to Aging to Aged
Geoffrey Handsfield, Justin Fernandez, Vickie Shim, Thor Besier

MS0426 In silico clinical trials of cardiac disease
Nenad Filipovic

0500-Materials by Design

MS0502 COMPUTATIONAL MECHANICS OF SOFT MATTER
Zishun Liu

MS0503	**COMPUTATIONAL DESIGN OF ARCHITECTED MATERIALS**

Julián Norato, José Guedes

MS0504	**Virtual Multi-physics Computational Design and Manufacturing Simulation of Materials and Structures**

Eric Li, JN Reddy, Guirong Liu, CW Lim, Vincent Tan, ZC He, Bing Li, Qiqi Li, Zhuoqun Zheng,
Lei Deng, Yi Wu

MS0506	**New Advances in Phase Change Materials**

Santiago Madruga

MS0507	**Multiscale Topology Optimization**

Narasimha Boddeti

MS0508	**Lessons from nature: design of bioinspired architected materials**

Mohammad J. Mirzaali, Mario Milazzo, Flavia Libonati, Davide Ruffoni, Amir A. Zadpoor

0600-Fluid Dynamics and Transport Phenomena

MS0601	**INTERFACIAL FLOW SIMULATION**

Mostafa Safdari Shadloo, Amin Rahmat, Alessio Alexiadis, Mohammad Mehdi Rashidi

MS0602	**Advanced multi-physics CFD simulations in science and engineering**

Takahiro Tsukahara, Kaoru Iwamoto, Koji Fukagata, Mamoru Tanahashi, Nobuyuki Oshima,
Makoto Yamamoto

MS0603	**Modelling and simulation of coupled solvent transport and deformation**

Jana Wilmers, Dai Okumura, Laurence Brassart, Nikolaos Bouklas

MS0604	**Granular Flows: Modelling and Computational Challenges**

Thomas Weinhart, Anthony R Thornton, Rudy Valette

MS0605	**COMPLEX FLUID FLOWS IN ENGINEERING: MODELING, SIMULATION AND OPTIMIZATION**

Stefanie Elgeti, Marek Behr

MS0607	**Multiphase flows**

Célio Fernandes, Luís Lima Ferrás, Alexandre Afonso

MS0608	**Fluid Dynamical Laws and Transport Phenomena for Complex Dynamical Systems**

Ricardo Tomás Ferreyra

MS0609	**MODELLING OF ATOMIZATION, BREAKUP AND FRAGMENTATION OF FLUIDS**

Stéphane Zaleski, Junji Shinjo, Leonardo Chirco, Gretar Tryggvason, Shiyi Chen

MS0610	**Modeling and Simulation of Computational Multi-phase Flows**

Yi-Ju Chou, Yang-Yao Niu

MS0611	**Multiphase flows with non-Newtonian materials: simulation, experiment, and machine learning**

Anselmo Pereira, Rudy Valette, Elie Hachem, Manuel Alves, Alvaro Coutinho

MS0612	**Collisional Kinetic modeling in classical and plasma dynamics: numerical methods and non-linear analysis**

Irene M. Gamba, Jeffrey R. Haack, Milana Pavic-Colic

MS0613	**Computational fluid dynamics and heat transfer**

KUANG Lin, Chuan Chieh Liao

0700-Numerical Methods and Algorithms in Science and Engineering

MS0701 **Numerical techniques for the simulation and model reduction of complex physical systems**
Thomas Hudson, Xingjie Li

MS0702 **Isogeometric Methods**
Alessandro Reali, Yuri Bazilevs, David J. Benson, René de Borst, Thomas J.R. Hughes, Trond Kvamsdal, Giancarlo Sangalli, Clemens V. Verhoosel

MS0703 **Developments and Applications of Discrete Element Method in Modelling and Simulation of Granular Systems**
Xihua Chu, Wenjie Xu, Zongyan Zhou, Mikio Sakai

MS0704 **Stabilized, Multiscale and Multiphysics Methods**
Guillermo Hauke, Arif Masud, Isaac Harari

MS0705 **Domain Decomposition and Large-scale Computation**
MASAO Ogino, Amane Takei, Qinghe Yao, Sin-Ichiro Sugimoto

MS0706 **DATA-BASED ENGINEERING & COMPUTATIONS**
Francisco Chinesta, Elias Cueto, Charbel Farhat, Pierre Ladeveze, Francisco Javier Montans

MS0707 **Advance and Application of Meshfree Methods**
Judy Yang, Chia-Ming Fan, Pai-Chen Guan, Tsung-Hui Huang, Kuan-Chung Lin

MS0709 **Recent Advances in Meshfree and Particle Methods**
Seiya Hagihara, Mitsuteru Asai, Ha Hong Bui, Fei Xu, Seiichi Koshizuka

MS0710 **Computational Particle Dynamics**
Moubin Liu, Dianlei Feng, Christian Weißenfels

MS0711 **Smoothed Finite Element Methods and Other Advanced FEMs**
Yuki Onishi, Gui-Rong Liu, Masaki Fujikawa, Quan Bing Eric Li

MS0712 **Boundary Element Methods and Mesh Reduction Methods**
Xiao-Wei Gao

MS0713 **Advances and Applications of Meshfree and Particle Methods**
Jiun-Shyan Chen, Frank Beckwith, Zhen Chen, Mike Hillman, Marc Schweitzer, Mike Tupek, Dongdong Wang, CT Wu, Pai-Chen Guan

MS0714 **Meshfree and Other Advanced Numerical Methods for Engineering and Applied Mathematical Problems**
Lihua Wang, Chuanzeng Zhang, Zheng Zhong

MS0715 **Multi-scale numerical methods for non-linear solids problems**
Frédéric Lebon, Isabelle Ramière

MS0716 **Model order reduction for parametrized continuum mechanics systems**
Youngsoo Choi, Masayuki Yano, Matthew Zahr

MS0717 **Modeling and Simulation of Polymer Fluids**
Xiaodong Wang, Puyang Gao, Jin Su

MS0719 **ADVANCES IN NUMERICAL METHODS FOR LINEAR AND NON-LINEAR DYNAMICS AND WAVE PROPAGATION**
Alexander Idesman, Hauke Gravenkamp

MS0720 Numerical models applied in architectonic and engineering design
Janusz Rębielak

MS0721 RECENT ADVANCES ON POLYTOPAL METHODS
Franco Dassi, André Harnist, Xin Liu, Ilario Mazzieri

MS0722 High-order numerical methods for compressible flow and turbulence
Lin Fu, Feng Xiao

MS0724 Non-Newtonian fluid flows: Numerical schemes and computational simulations
Hirofumi Notsu, Cassio M. Oishi

MS0725 Towards Next-Generation Aircraft Design with High-Fidelity Simulation Technologies
Yoshiaki Abe, Keiichi Shirasu, Tomonaga Okabe, Shigeru Obayashi

MS0726 High Performance Computing in Biomechanics
Xiao-Chuan Cai, Rongliang Chen

MS0727 Multi-level iterative solvers for finite element systems
Matthias Mayr, Martin Kronbichler, Santiago Badia

MS0728 Efficiency and reliability in biomedical modeling: computational and mathematical advances
Simona Perotto, Nicola Ferro, Hiroshi Suito

MS0729 Advances in High-Order Methods for Computational Fluid Dynamics
Krzysztof Fidkowski, Per-Olof Persson, Chunlei Liang, Ngoc Cuong Nguyen

MS0730 Structure-preserving model reduction for nonlinear systems
Boris Kramer, Yuto Miyatake

MS0731 Advances in Rigorous and Agile Coupling of Conventional and Data-Driven Models for Heterogeneous Multi-Scale, Multi-Physics Simulations
Pavel Bochev, Paul Kuberry, Irina Tezaur

MS0732 COMPUTATIONAL MODELLING AND EXPERIMENTAL IMAGING OF GRANULAR AND MULTIPHASE SYSTEMS: TOWARD IMPROVED VALIDATION AND SYNERGISTIC APPLICATION
Kit Windows-yule, Jonathan Seville

MS0733 Advanced Numerical Methods and Related Software Development
Amane Takei, Mohamed Shadi, Gabriel Wittum, Ryuji Shioya

MS0734 Discretization methods and software tools for the simulation of complex fractured media in computational geophysics
Patrick Zulian, Marco Favino, Maria Nestola, Rolf Krause

MS0737 Semi-analytical numerical methods and their applications in mechanics and engineering
Zhuojia Fu, Rui Li, Leiting Dong, Xiang Liu

MS0738 Nonlinearly Stable High-Order Methods for Partial Differential Equations
Siva Nadarajah, David Del Rey Fernández, Takanori Haga

MS0739 Quantum Horizons for Computational Mechanics
Suvranu De, Vikram Gavini, Veera Sundararaghavan, Eiji Tsuchida, Amartya Banerjee

MS0740 Machine learning methods for adaptive mesh refinement and finite element discretization
Brendan Keith, Maciej Paszynski

MS0741 NUMERICAL METHODS FOR BUCKLING ANALYSIS AND DESIGN OF THIN-WALLED STRUCTURES
Peng Hao, Yujie Guo, Ke Liang

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List of Minisymposia

MS0742 High-Order discretization of steady and unsteady biharmonic problems:
Applications in elasticity and fluid dynamics

Jean-Pierre Croisille, Matania Ben-Artzi, Dalia Fishelov

MS0743 ADVANCES IN INTRUSIVE AND NON-INTRUSIVE ORDER REDUCTION TECHNIQUES FOR
FLOW ANALYSIS, CONTROL AND OPTIMIZATION

Marco Fossati, Annalisa Quaini, Gianluigi Rozza

MS0744 Multilevel Discretization of Mixed Variational Formulations

Constantin Bacuta, Hengguang Li

MS0745 Waves: Advanced Numerical Methods and Applications

Reza Abedi, Robert Haber, Tamas Horvath

MS0747 Accurate and Efficient Solution Remapping Strategies for Coupled Multiphysics Systems

Vijay Mahadevan, Paul Ullrich

MS0748 Computational modeling and simulation of discontinuities

Amine Benzerga, Christian Brandl, Vincent Chiaruttini, Enrique Martinez, Ryan Sills,
Ashley Spear, Aurélien Vattré

MS0751 Boundary Element Method: Fundamentals and Applications

Toru Takahashi, Toshiro Matsumoto, Yijun Liu, Hitoshi Yoshikawa, Takahiro Saitoh,
Hiroshi Isakari, Kazuki Niino

0800-Verification and Validation, Uncertainty Evaluation and Error Estimation

MS0801 DATA-DRIVEN, SURROGATE, PHYSICS-INFORMED AND GREY-BOX MODELLING FOR
TREATING RANDOMNESS AND IMPRECISION IN COMPUTATIONAL ENGINEERING

Matthias Faes, Stefano Marelli, Jean-Marc Bourinet, Enrico Zio

MS0802 COPING WITH RANDOMNESS AND IMPRECISION IN COMPUTATIONAL MECHANICS

Matthias Faes, Pengfei Wei, Xiukai Yuan, Jingwen Song, Marcos Valdebenito, Michael Beer

MS0803 Quality of model prognosis - from lab data to structural performance

Jörg F. Unger, Steffen Freitag, Daniel Straub, Bruno Sudret, Francisco Chinesta, Michael Beer,
Phaedon-Stelios Koutsourelakis

MS0804 Physics-Based Data-Driven Modeling and Uncertainty Quantification in Computational
Materials Science and Engineering

Johann Guilleminot, Michael Shields, Lori Graham-Brady, Kirubel Teferra

MS0805 Certification of Computer Simulations and Adaptive Modeling

Serge Prudhomme, Ludovic Chamoin, Jens Lang, Fredrick Larsson, Juan José Ródenas García

MS0806 Verification techniques in computational physics and applied mathematics

Brian Freno, Luís Eça

MS0807 Numerical Analysis and Design with Polymoric Uncertainties – Advanced Methods and Strategies

Michael Kaliske, Wolfgang Graf, Sigrid Leyendecker, Stefanie Reese

MS0808 Numerical methods for verification, validation and uncertainty quantification in
manufacturing, civil engineering, advanced materials and biomechanics

Naoki Takano, Kazumi Matsui, Heoung-Jae Chun, Vittorio Sansalone, Tetsuya Matsuda, Shuji Moriguchi

MS0809 Uncertainty Quantification in Particle-Based Simulations of Fluids, Polymers, and Soft Matter

Gerald Wang

0900-Structural Mechanics, Dynamics and Engineering

MS0902 **Modelling of Structural Instability, Structural Collapse and Impact**
José Santelli

MS0903 **Vehicle Scanning Method for Bridges**
Yeong-bin Yang, Jong-Dar Yau, Judy P. Yang, Zhilu Wang

MS0904 **Shell and spatial structures**
Francesco Marmo, Stefano Gabriele, Amedeo Manuello Bertetto, Andrea Micheletti

MS0905 **Digital twins for the design and optimisation of lightweight structures**
Carol Featherston, David Kennedy, Zhangming Wu, Abhishek Kundu

MS0906 **New numerical methods for slender bodies and their interactions**
Ignacio Romero, Christoph Meier, Joaquim Linn, Bastian Oesterle

MS0907 **Multiscale mechanics of soft networks: from nonwovens to polymers and living tissues**
Franck Vernerey, Nikolaos Bouklas, Catalin Picu

MS0908 **NON-MATERIAL MODELLING OF AXIALLY MOVING CONTINUA:
ARBITRARY LAGRANGIAN-EULERIAN DESCRIPTION IN STRUCTURAL MECHANICS**
Yury Vetyukov, Alexander Humer, Josef Kiendl

MS0909 **New Advances in Computational Modelling and Seismic Intervention Techniques of Historical Masonry Structures**
Francesco Clementi, Antonio Formisano, Gabriele Milani

MS0910 **Adaptive Engineering Structures**
Malte von Scheven, Manfred Bischoff, Michael Böhm, Oliver Sawodny, Lucio Blandini

MS0911 **Digital Twins and Uncertainty Quantification in Structural Dynamics**
Thiago Ritto, Anas Batou, David Barton, David Wagg

MS0912 **Guided Wave-Based Structural Condition Assessment**
Eleni Chatzi, Konstantinos Agathos, Rohan Soman, Wieslaw Ostachowicz

MS0913 **Recent advances in semi-analytical approaches related to moving load problems**
Zuzana Dimitrovová, Piotr Koziol

MS0914 **MODELING AND SIMULATION OF FUNCTIONALLY GRADED AND MULTIFUNCTIONAL MATERIALS STRUCTURES**
Justin Murin, Stephan Kugler, Vladimir Kutis

MS0915 **Finite element time-history analysis of structural systems and contents subjected to dynamic actions and interactions**
Gloria Terenzi, Stefano Sorace

MS0916 **Data-Driven Computational Methods and Model Order Reduction for Structures, Structural Dynamics, and Aeroelasticity**
Haeseong Cho, Sang-Joon Shin

MS0917 **Origami engineering aided by computational mechanics**
Ichiro Hagiwara, Arzu Sorguç

MS0918 **Dynamic performance of ceramic composites and composite structures**
Eligiusz Postek, Tomasz Sadowski

MS0920   **Statics and Dynamics of Composite Structures and Metamaterials**
Jarosław Latalski, Alireza Ture Savadkoohi, Daniele Zulli

MS0921   **Advanced structural mechanics of smart and adaptive structures**
Rao B.N., Ayan Haldar

MS0922   **Advanced computational methods for wave analysis and their application**
Sohichi HIROSE, Takahiro SAITOH, Taizo MARUYAMA, Zhenghua Qian, Bing Wang

MS0923   **Modeling of Damping**
Chin-long Lee, Athol Carr

MS0924   **Structural Instability in Earthquake Engineering**
Tung-Yu Wu, Omar Sediek, Hsiao-Hui Hung

MS0927   **RECENT ADVANCES IN RAILWAY DYNAMICS NUMERICAL MODELLING**
Santiago Gregori, Stefano Bruni

MS0929   **Nonlinear computational structural dynamics in rotating turbomachinery**
Evangéline Capiez-lernout, Christian Soize, Christophe Desceliers, Marc Mignolet

MS0931   **Advances of Vehicle-Bridge Interaction Dynamics**
Jong-Dar Yau

1000-Manufacturing and Materials Processing

MS1001   **Modeling and Simulation for Additive Manufacturing**
Albert To, Yuichiro Koizumi, Andreas Lundback, Stefan Kollmannsberger, Akihiro Takezawa,
Ferdinando Auricchio, Massimo Carraturo, Simone Morganti, Mamzi Afrasiabi

MS1003   **Modeling, Simulation and Optimization of Functional Materials and Advanced Manufacturing**
Mahdi Bodaghi, Frederic Demoly, Giulia Scalet, Oliver Weeger, Ali Zolfagharian

MS1004   **Additive Manufacturing of Polymers - Towards the Digital Twin**
Dominic Soldner, Katrin Wudy, Julia Mergheim

MS1005   **Shape Optimization for Large-Scale Problems**
Long Chen, Nicolas R. Gauger, Kai-Uwe Bletzinger

MS1007   **MODELING AND SIMULATION APPROACHES OF METAL ADDITIVE MANUFACTURING
ON PART-SCALE**
Christoph Meier, Michele Chiumenti, Neil E. Hodge, Miguel Cervera, Wolfgang A. Wall

MS1010   **MANUFACTURING PROCESS MODELING AND THE EFFECTS OF MANUFACTURING ON THE
MECHANICAL PERFORMANCE OF COMPOSITES**
Patrick De Luca, Anaïs BARASINSKI, Kiyoshi UZAWA, Anthony WAAS

1100-Atomistic, Nano and Micro Mechanics of Materials

MS1101   **Multiscale Modeling for Materials**
YUCHIEH LO, I-Ling Chang, Chang-Wei Huang

MS1102   **Computational Nanomechanics and Nanoscale Thermal Transport**
Haifei Zhan, Gang Zhang, Yuantong Gu

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List of Minisymposia

MS1103 **Composites, Bio-composites and Nanocomposites**
Jia-Lin Tsai, Jia-Yang Juang

MS1104 **Deformation Analysis of Carbon Nanomaterial with Lattice Defects**
Yi-Lun Liu, Jin-Xing Shi, Xiao-Wen Lei

MS1105 **Modeling and Simulation of Materials under Harsh Environments**
Keonwook Kang, Byeongchan Lee, Seunghwa Ryu, Akiyuki TAKAHASHI

MS1106 **Nanomechanics of defects in crystalline materials**
Tomotsugu Shimokawa, Takahiro Shimada, Ryosuke Matsumoto, Hajime Kimizuka

MS1107 **Modeling Mechanics of Materials with Voids**
Matthew Lewis, Gary Gladysz

MS1108 **Topological Defects in Mechanics, Mathematics, Physics, and Beyond**
Gerald Wang, Amit Acharya, Franziska Weber

MS1110 **Frontier in nano-scale graphene and AI-assisted design of graphene-like architect materials**
Zhao Qin, Chi-Hua Yu

1200-Modeling and Analysis of Real World and Industry Applications

MS1201 **NON-CONVENTIONAL METHODS FOR SOLID AND FLUID MECHANICS (NMSFM)**
Wojciech Sumelka, Tomasz Blaszczyk, Hongguang Sun, Jacek Leszczynski, Giuseppe Failla

MS1202 **MODELING METHODS, SIGNAL ALGORITHMS AND MACHINE LEARNING FOR EFFECTIVE NON-DESTRUCTIVE TESTING AND STRUCTURAL HEALTH MONITORING**
Menglong Liu, Gongfa Chen, Fangsen Cui

MS1203 **Nonlocal models in computational mechanics: perspectives, challenges, and applications**
Mirco Zaccariotto, Marta D'Elia, Ugo Galvanetto, Pablo Seleson

MS1204 **Combined finite-discrete element methods for multi-body dynamics and fracture mechanics**
Ado Farsi

MS1205 **Real World Modeling and Simulation for the realization of Human-centered Society 5.0**
Tohru Hirano, Seiichi Koshizuka

MS1206 **Condition assessment of railway infrastructures**
Pedro Montenegro, Munemasa Tokunaga, Matsuoka Kodai, Diogo Ribeiro

MS1207 **Offshore Wind Power : Large Scale Modeling and Assesment for the Realization of Net-zero World**
Takanori Uchida

MS1208 **Industrial Application of Particle Methods**
Sunao Tokura, Massimo Galbiati, Brant Ross, Mamika Kawahara

MS1209 **Advanced Computing Technique and Artificial Intelligence for Realistic Social, Traffic and Economic Problems**
Hideki Fujii, Eisuke Kita, Tomoaki Tatsukawa, Shinobu Yoshimura

MS1211 **Particle and Finite Element Models for Interaction, Simulation and Statistical Design**
Masakazu Ichimiya, Nobuki Yamagata, Jeffrey Fong, Robert Rainsberger, Pedro Marcal

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MS1213 Modeling&Simulation of Terrestrial Flows (Terrestrial(Geosphere) hydrologic/hydraulic flow modeling&simulation)

Hiroyuki Tosaka, Makoto Nishigaki, Tomochika Tokunaga, Masaatsu Aichi, Tomonari Shiraishi

MS1214 Advanced Modelling for Automotive Applications in CASE Era

Tohru Hirano, Kosho Kawahara, Masato Nishi, Maurizio MAGGIORE

MS1215 Image Processing, Discretization, and Simulation of As-Built Geometries

Scott Roberts, Nagi Mansour, David Noble

MS1216 Solid Mechanics of Elastomers

Hiro Tanaka, Hiroshi Kadowaki

MS1217 Analysis of Real World and Industry Applications:
emerging frontiers in CFD computing, machine learning and beyond

Eleni Koronaki, Anina Šarkić Glumac, Stéphane P.A. Bordas

MS1218 Industrial Perspectives on Isogeometric Analysis and Design with Advanced Spline Techniques

Panagiotis Karakitsios, Vasiliki Tsotoulidi

MS1219 Cyclic plasticity and viscoplasticity modeling for various alloys and components

Tasnim Hassan, Katsuhiko Sasaki

MS1220 HPC application on turbulent wind over urban model represented by individual shape of buildings

Tetsuro Tamura, Yasuaki Ito, Hidenori Kawai

1300-Inverse Problems, Optimization and Design

MS1301 Computational structural design for architecture and civil engineering

Makoto Ohsaki, Sigrid Adriaenssens, Ruy Pauletti, Yohei Yokosuka

MS1302 Model Learning and Optimization for Nonlocal and Fractional Equations

Yue Yu, Marta D'Elia, Xingjie Li

MS1303 ANALYSIS AND DESIGN OF STRUCTURAL DYNAMICAL SYSTEMS UNDER UNCERTAIN CONDITIONS

Hector Jensen, Jianbing Cheng, Marcos Valdebenito, Ioannis Kougioumtzoglou, Dixiong Yang

MS1304 Optimization Method and Application

Eisuke Kita, Kazuhiro Izui, Masatoshi Shimoda, Satoshi Kitayama, Masayuki Nakamura

MS1305 New Trends in Topology Optimization

EMILIO CARLOS NELLI SILVA, Shinji Nishiwaki, Yoon Young Kim, Glaucio Paulino, Gregoire Allaire, Daniel De Leon, Renato Picelli

MS1306 Topological Design Optimization of Structures, Machines and Materials

Gil Ho Yoon, Akihiro Takezawa, Weisheng Zhang

MS1307 Machine Learning and Uncertainty Quantification for Materials Design

Vahid Keshavarzzadeh, Arash Noshadravan, Johann Guilleminot

MS1308 OPTIMIZING CIVIL STRUCTURES DESIGN – HOW TO ADDRESS MULTIMATERIAL, MULTICRITERIA AND MULTIPHYSICS PROBLEMS TO REDUCE THE GLOBAL CARBON FOOTPRINT

Fabrice Gatuingt, Guillaume Hervé-Secourgeon, Tulio Honorio de Faria

MS1309 Recent progress in topology optimization and its applications

Junji Kato, Mathias Wallin, Niels Aage, Oded Amir, Bin Niu, Liang Xia, Mingdong Zhou, Peter Dunning

MS1311   **ADVANCED APPROACHES FOR OPTIMIZATION OF COMPOSITE STRUCTURES**
Elena Raponi, Simonetta Boria, Carola Doerr, Fabian Duddeck, Dirk Lukaszewicz

MS1314   **STATISTICAL INVERSE PROBLEMS AND RELATED STOCHASTIC OPTIMIZATION METHODS FOR RANDOM HETEROGENEOUS MATERIALS**
Florent Pled, Christophe Desceliers, Maarten Arnst

MS1315   **Engineering Metamaterials: Rational Design and Additive Manufacturing**
Zhen Luo, Yiqiang Wang, Hao Li

1400-Software, High Performance Computing

MS1401   **PSE (Problem Solving Enviornment)**
Shinji Hioki, Masami Matsumoto, Shigeo Kawata

MS1402   **Software Design and Implementation for Next-Generation Parallel Architectures**
David Littlewood, Henry Tufo, Hiroshi Okuda, Reese Jones

MS1403   **Advanced HPC Methods for Eigenvalue Problems and Beyond**
Ali Hashemian, David Pardo, Victor Calo, Carla Manni, Quanling Deng

MS1404   **Progress and Challenges in Extreme Scale Computing and Data**
Michael Heroux, Serge Petiton, Kengo Nakajima

MS1405   **HPC-BASED SIMULATIONS AND DATA SCIENCE FOR THE WIDE INDUSTRIAL REALM: AEROSPACE, AUTOMOTIVE, BIOMEDICAL, CONSTRUCTION, HEAVY…**
Makoto Tsubokura, Mariano Vázquez, Takayuki Aoki, Andreas Lintermann

MS1406   **Portable, Efficient Implementation of Finite Elements for Mechanics Applications**
Kyungjoo Kim, Mauro Perego, Nathan Roberts

1500-Fluid-structure Interaction, Contact and Interfaces

MS1501   **Computational Contact Mechanics**
Peter Wriggers, Michel Raous, Giorgio Zavarise, Mike Puso

MS1502   **Fluid-Structure Interaction Algorithms and Applications**
Justin Kauffman, Scott Miller, John Gilbert

MS1503   **Recent Advances in Numerical Methods for Multi-Material Shock Hydrodynamics**
Ketan Mittal, Nabil Atallah, Vladimir Tomov, Guglielmo Scovazzi, Robert Rieben

MS1505   **Computational Fluid-Structure Interaction and Moving Boundaries and Interfaces**
Artem Korobenko, Jinhui Yan, Ming-Chen Hsu, Kenji Takizawa, Yuri Bazilevs, Tayfun Tezduyar

MS1506   **Challenges and locks for fluid-structure interaction: from vibrations to non-linear transients in industrial framework**
Vincent Faucher, Olivier Jamond, Nicolas Lelong, Benoît Prabel, Maria-Adela Puscas

MS1507   **Novel Numerical Algorithms for Fluid-Structure Interaction and Optimization for Flow Energy Converter**
Ming-jyh Chern, Chao-An Lin, Tzyy-Leng Horng

MS1508   **IMMERSED BOUNDARY METHOD AND ITS NOVEL APPLICATIONS**
Li Wang, Fang-Bao Tian, Wei-Xi Huang, Zhengliang Liu, Yi Zhu

MS1510 Fluid-structure Interaction, Contact and Interfaces

Peng Du, Haibao Hu, Xiaopeng Chen, Feng Ren, Xiao Huang, Luo Xie, Jun Wen

1600-Geomechanics and Natural Materials

MS1602 Computational Geomechanics

Jinhyun Choo, José Andrade, Chloé Arson, Ronaldo Borja, Richard Regueiro, WaiChing Sun, Jidong Zhao

MS1603 Computational Methods for Snow Mechanics and Engineering

Fabrizio Barpi, Gianmarco Vallero, Monica Barbero, Mauro Borri-Brunetto, Valerio De Biagi

MS1604 Machine learning in geomechanics and geomaterials

Jianfeng Wang

MS1605 Validation of Numerical Modeling of Soil-Structures Interaction in Liquefiable Soils

Majid Manzari, Kyohei Ueda

MS1607 Multiscale, Multifield, and Continuum-Discontinuum Analysis in Geomechanics

Haitao Yu, Qiushi Chen, Yiming Zhang, Xueyu Geng, Ningning Zhang, Hui Wang, Yunteng Wang

MS1608 Particle-based numerical modeling in Geotechnical engineering

Yukio Nakata, Kenichi Soga, Mingjing Jiang, Shuji Moriguchi

MS1609 Advanced computational modelling of wood, wood-based products, and timber structures

Josef Füssl, Markus Lukacevic, Josef Eberhardsteiner, Michael Kaliske

MS1610 Numerical methods in geomechanics

Ryosuke Uzuoka, Kazunori Fujisawa, Toshihiro Noda, Feng Zhang

MS1611 Computational Granular Mechanics

Hongyang Cheng, Klaus Thoeni, Xue Zhang, Vanessa Magnanimo

MS1612 Multiscale Modeling and Numerical Stress Analysis of Prestressed Rocks

Vladimir Levin, Konstantin Zingerman, Anatoly Vershinin

MS1613 Challenges in sea ice mechanics research
– experimental investigation, theroretical description and numerical simulation

Jörg Schröder, Carina Schwarz, Doru C. Lupascu, Tim Ricken, Marcello Vichi, Sebastian Skatulla

MS1614 Recent Advances in Computational Geomechanics

Nasser Khalili, Mohammad Vahab, Babak Shahbodagh

1700-Data Science, Machine Learning and Artificial Intelligence

MS1701 Applications of Artificial Intelligence and Machine-Learning Methods to Mechanics, Materials, Medicine, and Engineering

Shaofan Li, Vickie Shim, Ying Li, Harold Park, Shingo Urata

MS1702 Machine Learning for Cardiac Modelling and Simulation

Simone Pezzuto, Francisco Sahli Costabal, Rolf Krause, Hermenegild Arevalo, Luca Dedé

MS1703 Incorporating fundamental principles in innovative machine learning models of physics

Reese Jones, Ari Frankel, Cosmin Safta, Nathaniel Trask

MS1704 Deep Learning in Computational Materials Science and Engineering

Shaoping Xiao

MS1705 Data-driven and Machine learning Method for turbulence, Fluid Loads, and fluid-structure Interaction
GANG CHEN, WEIWEI ZHANG, HUI TANG, Richard P. Dwight

MS1706 Decision-making in large-scale atomistic material simulations
Danny Perez, Thomas Swinburne

MS1707 Uncertainty Quantification for Data-Intensive Inverse Problems and Machine Learning
Tan Bui-thanh, Andreas Mang

MS1708 Machine Learning Based Design of Composite Materials and Structures
Seunghwa Ryu, Grace Gu, Shu-Wei Chang, Zhao Qin

MS1710 Numerical Simulations and Machine Learning for Micro-Meteorology Predictions and Applications
Ryo Onishi, Kai Schneider, Tomoaki Watanabe, Shaoxiang Qian, Keigo Matsuda

MS1711 Learning models for reliable predictions and decision making: methods and applications
Laura Mainini, Matteo Diez

MS1712 Machine Learning and Computational Modeling for Mechanical Behavior of Materials
C-S David Chen, C.T. Wu, Nien-Ti Tsou

MS1713 Deep and Machine Learning Methodology in the Context of Application to Computational Mechanics
Yasushi Nakabayashi, Yoshitaka Wada, Masao Ogino, Akio Miyoshi, Shinobu Yoshimura

MS1714 Advances in scientific machine learning for high dimensional many-query problems
Thomas O'Leary-Roseberry, Peng Chen, Omar Ghattas

MS1715 Intelligent design optimization of structural and mechanical systems
Jun Yan, Bin Niu

MS1716 Data-driven approaches in computational solid mechanics
Pietro Carrara, Francisco Chinesta, Laura De Lorenzis, Siddhant Kumar, Pierre Ladeveze, Michael Ortiz, Stefanie Reese

MS1717 Recent Advances in Scientific Machine Learning and Uncertainty Quantification Methods for Modeling Complex Systems
Ramin Bostanabad, Miguel Bessa

MS1718 Machine Learning-Based Computational Methods in Engineering Mechanics
Alessandro Fascetti, John Brigham, Caglar Oskay

MS1719 Advances in data-driven methods through Gaussian processes
Mengwu Guo, Anirban Chaudhuri

MS1720 Machine-Learning Accelerated Inverse Design
Aditya Balu, Olga Wodo, Adarsh Krishnamurthy, Baskar Ganapathysubramanian

1800-Imaging, Visualization, Virtual Reality and Augmented Reality

MS1802 Computer Vision on Structural Experiments, Inspection, and Monitoring
Yuan-sen Yang

2100-Environmental, Energy and Resource Engineering

MS2101   **Computational Mechanics for Nuclear Waste Disposal Technologies**
Shin Sato, Shinya Tachibana, Stratis Vomvoris

MS2102   **COMPUTATIONAL METHODS FOR ENVIRONMENTAL FLUID FLOWS**
Clint Dawson, Kazuo Kashiyama, Ethan Kubatko, Eirik Valseth

2200-Disaster Prevention and Mitigation, Safety Problems

MS2201   **Advanced Computational and Experimental Technologies for Civil Infrastructures**
Sukhoon Pyo, Beomjoo Yang, H.K. Lee

MS2202   **Frontiers of Nonlinear, Impact and Instability Analysis of Solids and Structures**
Daigoro Isobe, Kostas Danas, Jinkoo Kim, Sergio Turteltaub, Dai Okumura,
Shingo Ozaki, Hiroyuki Yamada

MS2203   **Hyper-complex disaster simulation**
Mitsuteru Asai, Antonia Larese De Tetto, Miguel Ángel Celigueta, Shunichi Koshimura, Kenjiro Terada

MS2204   **Simulation-based Disaster Prediction and Mitigation**
Dongdong Wang, J.S. Chen, Sheng-Wei Chi, Pai-Chen Guan, Mike Hillman, Xiong Zhang

MS2205   **Microstructural characterization and property evaluation of materials for structural safety**
Kyoungsoo Park, Tong-Seok Han

MS2206   **Advanced seismic response analysis and design**
Tomoshi Miyamura, Takuzo Yamashita, Daigoro Isobe, Makoto Ohsaki

MS2208   **Physics-based Simulation of Earthquake Hazards with HPC and HQC**
Takane Hori, Tsuyoshi Ichimura, Mitsuteru Asai, Thorsten Becker

2300-Infectious Diseases and Environmental Problems

MS2301   **Recent advances in modeling and simulating infectious disease outbreaks**
Tan Bui-thanh, Leticia Ramirez, Jose Montoya-Laos

2400-Others

MS2401   **Recent advances on numerical methods and parallel solvers for the cardiac function**
Luca F. Pavarino, Simone Scacchi, Christian Vergara

MS2403   **Numerical Methods for Solving Frictional Quasistatic Contact Problems**
Nicolae Pop

MS2404   **Reliability of Robots**
Xu Han, Shuyong Duan

MS2405   **Benchmark technologies and cases for computational acoustics**
Weikang Jiang, Haijun Wu

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*Underlined author: Speaker

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Eigo Watanabe, Junki Hanyu, Yota Kawachi, Takumi Ashida, Mao Kurumatani

2550 High Quantile Estimation for Transpiration Cooling
Ella Steins, Michael Herty

2784 Uncertainty Quantification and Validation in Failure Simulation of Reinforced Concrete Using Discrete Element Model
Yoshihito Yamamoto, Toshihide Saka, Mao Kurumatani, Naoshi Ueda

2913 A trial for validating the model of reinforced concrete beams with emphasis on uncertainty quantification
Toshihide Saka, Yoshihito Yamamoto, Naoshi Ueda, Mao Kurumatani

MS0809 Uncertainty Quantification in Particle-Based Simulations of Fluids, Polymers, and Soft Matter

3414 **"This One Weird Trick to Put Error Bars on Molecular Simulations, Statisticians Love It!"**
Yuanhao Li, Gerald Wang

MS0902 Modelling of Structural Instability, Structural Collapse and Impact

1534 Finite Element Analysis at Pin Joints of Modular Bridge under Uniaxial Tensile Loads
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MS0903 Vehicle Scanning Method for Bridges

364 Vehicle-Bridge Interaction System with Non-Uniform Cross-Sections
Judy Yang, Chun-Hsien Wu

565 Detecting Bridge's Frequencies by the Rocking Motion of a Moving Test Vehicle
Hao Xu, Y.B. Yang

1007 Identification of track/bridge frequencies and track modulus by a instrumented moving test vehicle
Kang Shi, Yeong-Bin Yang, Zhilu Wang, Hao Xu

1761 Identification of Bridge Damage Location utilizing Low-pass filtered Accelerations of Slow Moving Cars
Xuzhao Lu, Limin Sun, Chul-Woo Kim, Kai-Chun Chang, Zhuoran Han

1791 Detection of bridge frequencies using passing vehicles
Shota Urushadze, Jong-Dar Yau, Jan Bayer

2001 Bridge Modal Measurement Using a Novel Frequency-Free Test Vehicle in Parked State: Theory and Experiment
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MS0904 Shell and spatial structures

942 A numerical approach to the design of gridshells for WAAM
Matteo Bruggi, Vittoria Laghi, Tomaso Trombetti

1374 A computational framework for modeling discontinuities in anisotropic rods
Tian Yu, Francesco Marmo, Salvatore Sessa, Sigrid Adriaenssens

1538 Forensic Evaluation of Historic Shell Structure: Development of In-Situ Geometry
Joshua Schultz, Katrina L. Springer, Joseph A. Roberson, Jackson M. Carroll, Mark D. Hegbloom

1837 Multi-body Rope Approach for the Form-Finding of Shape Optimized Grid Shell Structures
Amedeo Manuello, Jonathan Melchiorre, Laura Sardone, Giuseppe Carlo Marano

1839 Damaging Configurations in Arch Structures with Variable Curvature and Tapered Cross-section
Jonathan Melchiorre, Amedeo Manuello Bertetto, Laura Sardone, Giuseppe Carlo Marano

1857 Experimental Investigation of the Static and Dynamic behaviors of 3D-Printed Shell Structures
Raffaele Cucuzza, Alessandro Cardoni, Amedeo Manuello, Marco Domaneschi, Gian Paolo Cimellaro, Giuseppe Carlo Marano

1861 Evolution of Distribution Algorithm for Constrained Optimization in Structural Design
Marco Martino Rosso

2947 A Very Simple Fully Nonlinear Shell Finite Element
Matheus Lucci Sanchez, Cinthia A.G. Sousa, Paulo M. Pimenta

3019 Discovering Reciprocal Tensegrities with Symmetric Connectivity
Pierluigi D'Acunto, Andrea Micheletti

3305 Evaluation of Tensegrity-Like Units for Nonlinear Mechanical Metamaterials
Andrea Micheletti, Claudio Intrigila, Nicola A. Nodargi, Edoardo Artioli, Fernando Fraternali, Paolo Bisegna

3399 Finite Element Analysis of Load Capacity of Panel Bridge with Multi-Scissors Structure
Kumi Ohno, yuki chikahiro

MS0905 Digital twins for the design and optimisation of lightweight structures

2043 Study on Improvement of Bending Strength of Thin-Walled Structures Composed of Sandwich Panels
Kouta Asaumi, Kuniharu Ushijima

2132 The ROM-driven optimization of composite laminated plates for buckling and postbuckling performances
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2180 Nonlinear Dynamic Characteristics and Resonant Actuation of Bi-stable Structures
Yuting Liu

2356 Damage modelling and detection in beams by Newton-Raphson method
Akshay Satpute, David Kennedy, Carol Featherston, Abdullah Mutabbakani

2372 Bayesian data-driven learning of industrial light weight structure design optimisation under uncertainty
David Walton, Carol Featherston, David Kennedy, Abhishek Kundu

3391 Postbuckling Optimization of Stiffened Panels via Topological Design
Sheng Chu, Carol Featherston, David Kennedy, Hyunsun Kim

MS0906 New numerical methods for slender bodies and their interactions

560 A New Mixed FE-Formulation for Liquid Crystal Elastomer Films *Keynote Lecture*
Michael Groß, Francesca Concas, Julian Dietzsch

1001 Viscoelastic Glass Plates Co-Sagging Simulation Coupled with Air Suction
Zheming Zheng, Steve Burdette, Anurag Jain

1022 Experimental investigation and mechanical characterisation of cables
Prateek Sharma, André Hildebrandt, Alexander Düster, Stefan Diebels

1289 Modelling Collisions and Fluid-Structure Interaction for Highly Flexible Cosserat Rods
Bastian Löhrer, Silvio Tschisgale, Jochen Fröhlich

1376 A General Higher-Order Shell Theory for incompressible and anisotropic hyperelastic materials using Orthonormal Moving Frame: an application to Arterial Mechanics
Archana Arbind

1584 New Experimental Characterisation of Cable Systems
Carole Tsegouog, Vanessa Dörlich, Joachim Linn, Stefan Diebels

1823 An objective and path independent geometrically non-linear Reissner-Mindlin shell formulation *Keynote Lecture*
Alexander Müller, Manfred Bischoff

2693 A Simple Fully Nonlinear Triangular Shell Finite Element
Cinthia Sousa, Matheus Sanchez, Paulo Pimenta

3200 Intrinsically selective mass scaling for hierarchic beam, plate and shell formulations
Bastian Oesterle, Lisa-Marie Krauß, Rebecca Thierer, Anton Tkachuk, Manfred Bischoff

MS0907 Multiscale mechanics of soft networks: from nonwovens to polymers and living tissues

1808 Discrete Network Models inspire a new class of Continuum Constitutive Models for Fibre Network Materials
Ben-Rudolf Britt, Alberto Stracuzzi, Edoardo Mazza, Alexander E. Ehret

3377 Modal tests of inflatable wings based on distributed MFC actuators
Fanmin Meng, Qiyue Ma, Nuo Ma, Junhui Meng

MS0908 NON-MATERIAL MODELLING OF AXIALLY MOVING CONTINUA: ARBITRARY LAGRANGIAN-EULERIAN DESCRIPTION IN STRUCTURAL MECHANICS

676 Non-material kinematic modelling in roll forming of steel sections
Emin Kocbay, Yury Vetyukov

1592 Geometrically Exact Dynamics of Sliding and Rotating Nested Rods for Modeling Concentric Tubes Robots
Federico Renda, Costanza Armanini, Frederic Boyer

1706 Sticking and sliding of an endless elastic strip on a moving rough surface
Yury Vetyukov

2228 Mixed Eulerian Lagrangian Approach in Rolling Mill Simulations
Peter G. Gruber, Klaus Löhe

2926 A mixed finite-element formulation for axially moving continua
Alexander Humer, Astrid Pechstein, Michael Kommer

MS0909 New Advances in Computational Modelling and Seismic Intervention Techniques of Historical Masonry Structures

2166 Seismic Vulnerability Assessment of Historic Masonry Buildings through Fragility Curves Approach
Grigor Angjeliu, Giuliana Cardani, Elsa Garavaglia

2219 Unbonded Fiber Reinforced Elastomeric Isolators (UFREIs) made of high damping natural rubber blends
Gaetano Pianese, Gabriele Milani, Antonio Formisano

2905 The non-smooth tale of Accumoli civic tower
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Mattia Schiavoni, Ersilia Giordano, Francesco Clementi

3235 Out of Plane Lower Bound Limit Analysis
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MS0910 Adaptive Engineering Structures

567 Fault Diagnosis for Adaptive Structures
Jonas Stiefelmaier, Michael Böhm, Oliver Sawodny, Cristina Tarín

612 Control Strategies for Adaptive High-Rise Structures
Spasena Dakova, Julia Laura Heidingsfeld, Michael Boehm, Oliver Sawodny

811 Optimization-Based Studies on the Integration of Load Alleviating Deformation Behaviour in Active Morphing Wing Sections
Florian Dexl, Andreas Hauffe, Klaus Wolf, Johannes Markmiller

999 Actuation of concrete slabs under bending with integrated fluidic actuators
Markus Nitzlader, Matthias J. Bosch, Hansgeorg Binz, Matthias Kreimeyer, Lucio Blandini

1130 Effective range of integrated fluidic actuators in structural elements
Matthias J. Bosch, Markus Nitzlader, Timon Burghardt, Matthias Bachmann, Hansgeorg Binz, Lucio Blandini, Matthias Kreimeyer

1626 State Estimation for Adaptive Structures
Amelie Zeller, Michael Böhm, Oliver Sawodny, Cristina Tarín

1921 Formulation of actuation units for stress-free control of deformations in statically indeterminate adaptive structures using actuation influence matrices
Simon Steffen, Lucio Blandini, Werner Sobek

2427 Vibration control of simply supported beam bridges equipped with an underdeck adaptive tensioning system
Arka Prabhata Reksowardojo, Gennaro Senatore, Manfred Bischoff, Lucio Blandini

MS0911 Digital Twins and Uncertainty Quantification in Structural Dynamics

509 Transfer learning to leverage digital twins in drill string dynamics
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528 DRILL STRING MODEL SELECTION AND PARAMETER ESTIMATION
Daniel Castello, Thiago Ritto, Michael Souza

727 The Local/Global Coefficient of Friction of Elastic Contacting Bodies with Random Roughness
Han Hu, Anas Batou, Huajiang Ouyang

1347 An Approach for Optimal Sequential Sensor Placement Under Steady-State Dynamics
Mark Chen, Kavinayan Sivakumar, Gregory Banyay, Jessica Preston, Brian Golchert, Timothy Walsh, Michael Zavlanos, Wilkins Aquino

2370 Robust State-Input Estimation for Differential Algebraic Equations and Application to Multibody Systems
Tommaso Tamarozzi, Pavel Jiránek, Daniel De Gregoriis

2371 Pitch Bearing Parameter Estimation for Virtual Wind Turbine Testing Applications
Lorenzo Mazzanti, Mathijs Vivet, Ali Rezayat, Daniel De Gregoriis, Tommaso Tamarozzi, Pavel Jiránek, Wim Desmet

2873 Stochastic Physics-based Model Updating for Fatigue Crack Detection in Riveted Lap Joints Using Lamb Waves
Wongon Kim, Byeng D. Youn

2906 Learning measured bifurcation diagrams with physics-based models augmented by machine-learnt structures *Keynote Lecture*
Sandor Beregi, David Barton, Djamel Rezgui, Simon Neild

2963 The Comparison of Sensor Optimisation Strategies for Structural Health Monitoring Using Machine Learning
Tingna Wang, Keith Worden, Robert Barthorpe, David Wagg

2976 Comparative Study of Statistical Model Calibration Framework for Li-Ion Battery Health Estimation
Hyunhee Choi, Byeng D. Youn

3236 RL-ABC For Model Selection And Parameter Calibration Applied To A Non-Linear Experimental Test Rig That Emulates A Dynamical System Evolving Over Time
Thiago Ritto, Sandor Beregi, David Barton

MS0912 Guided Wave-Based Structural Condition Assessment

955 Simulation of wave propagation in remote bonded FBG sensors using the spectral element method
Piotr Fiborek, Rohan Soman, Pawel Kudela, Wieslaw Ostachowicz

1633 Damage detection in isotropic cracked rod via fusion of genetic algorithm with deep learning-based wave propagation simulators
Jitendra Sharma, Piotr Fiborek, Rohan Soman, Pawel Kudela, Konstantinos Agathos, Eleni Chatzi, Wieslaw Ostachowicz

1698 A Parametric Reduced Order Model (pROM) for Structural Health Monitoring (SHM) relying on Ultrasonic Guided Waves
Paul Sieber, Sergio Nicoli, Konstantinos Agathos, Rohan Soman, Wieslaw Ostachowicz, Eleni Chatzi

2368 Lamb wave-based damage identification in bounded structures through an inverse Bayesian process
Wen Wu, Dimitrios Chronopoulos, Sergio Cantero Chinchilla, Muhammad Khalid Malik, Wangji Yan, Rasa Remenyte-prescott

2436 Full Waveform Inversion of Seismic Input Motions at a Domain Reduction Method Boundary in a PML-truncated domain
Bruno Guidio, Heedong Goh, Chanseok Jeong

MS0913 Recent advances in semi-analytical approaches related to moving load problems

3275 Critical Velocity and Instability of Inertial Objects Moving Uniformly on Layered Track Models *Keynote Lecture*
Zuzana Dimitrovová

MS0914 MODELING AND SIMULATION OF FUNCTIONALLY GRADED AND MULTIFUNCTIONAL MATERIALS STRUCTURES

745 Warping Torsion of FGM Beams with Open Cross-section and Spatially Varying Material Properties
Justin Murin, Stephan Kugler, Juraj Hrabovsky, Juraj Paulech, Vladimir Kutis, Mehdi Aminbaghai

832 A Generalized Beam Theory and its Applications in FGM Beam Structures *Keynote Lecture*
Stephan Kugler, Peter Fotiu, Justin Murin

2323 Analysis and Testing of Modular Functionally Graded Soft Metamaterial
Jan Novak, Jan Havelka, Martin Doškář, Jozef Michálek

2577 A numerical analysis of magnetic heterogeneous microstructures based on micromagnetic finite element simulations
Maximilian Reichel, Jörg Schröder

3293 Active Vibration Control of Aluminum Beam using Piezoelectric Actuator
Šimon Berta, Vladimír Goga, Vladim2ír Kutiš, Ladislav Šarkán

3294 Beam Finite Element with Piezoelectric Layers - Modeling and Control
Vladimir Kutis, Juraj Paulech, Gabriel Galik, Justin Murin, Vladimir Goga, Michal Miloslav Ulicny, Simon Berta

3298 Analysis of Actuator Structure Using New Electro-Thermo-Mechanical Finite Element Derived for Functionally Graded Materials
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MS0915 Finite element time-history analysis of structural systems and contents subjected to dynamic actions and interactions

579 Using transit finite element method to evaluate the Structure-borne noise levels of metro system bridges
Wei-Lun Hsu

2164 Mitigation of Seismic Pounding between Adjacent Buildings by means of Isolation and Supplemental Dissipation at the Base
Fabio Mazza, Rodolfo Labernarda

2171 Code-Oriented Floor Acceleration Response Spectra of RC Framed Buildings Accounting for Nonlinear Response of Masonry Infills
Angelo Donnici, Fabio Mazza

MS0916 Data-Driven Computational Methods and Model Order Reduction for Structures, Structural Dynamics, and Aeroelasticity

796 Improved Parametric Model Order Reduction for Fluid-structure Interaction
Sihun Lee, KiJoo Jang, Haeseong Cho, Haedong Kim, SangJoon Shin

930 Further Evaluation on the Projection-based Model-order Reduction Considering the Nonlinear Properties
Yongse Kim, Seung-Hoon Kang, Haeseong Cho, SangJoon Shin

1320 Study on Damage Detection Technique Based on Structural Displacement/Strain Data Using eXplainable Artificial Intelligence and Experimental Validation Using DIC Data of Tensile Specimens
Inho Jeong, Hyejin Kim, Hyungbum Park, Taeseong Kim, Haeseong Cho

1525 Deep learning-based Approach for prediction of Airfoil Aerodynamic Performance in Low Reynolds number
Seongwoo Cheon, Hojin Jeong, Haeseong Cho, Hakjin Lee

1527 An efficient data-driven model reduction approach for multiscale homogenization of a microstructure with hysteretic mechanical behavior
Hyejin Kim, Inho Jeong, Haeseong Cho, Maenghyo Cho

2801 An efficient DNN-based Data-Driven Modeling algorithm for the Real-Time Flexible Multibody dynamics
Seongji Han, Hee-Sun Choi, Juhwan Choi, Jin Hwan Choi, Jin-Gyun Kim

2830 Prediction and Validation of the Dynamic Characteristics of 3D Rotor Blades using Convolutional Neural Networks with Image Composition
Hong-Kyun Noh

3047 Exact Model Reduction of Nonlinear Finite Element Models via Spectral Submanifolds
Shobhit Jain, George Haller

3069 Model Order Reduction of Coupled Problems in Structures
Gowri Y Subedar, Gourav Kumbhojkar, Amar K Gaonkar

MS0917 Origami engineering aided by computational mechanics

2208 Origami metamaterial reconstructing any structure including non-convex curved surface in a row
Luis Diago, Junichi Shinoda, Ichiro Hagiwara

2260 Proposition of a new "Energy density topology optimization method for eigen frequencies" and its application to origami safe carrier box
Toshie Sasaki, Ichiro Hagiwara

3378 Development of New sound insulation simulation technology using Finite element method and its application to Origami core
Aya Abe, Ichiro Hagiwara

3423 A new crash absorbing origami structure RTO and comparison of RTO with origami structures with 4 folding lines at intersection *Keynote Lecture*
Ichiro Hagiwara

3424 Origami to Decode Folding Strategies in Nature
Arzu Gönenç Sorguç, Müge Kruşa Yemişcioğlu, Ichiro Hagiwara

MS0918 Dynamic performance of ceramic composites and composite structures

777 Numerical Modelling of Influence of Interface Properties on the Performance of Interpenetrated Composites
Eligiusz Postek, Tomasz Sadowski

MS0920 Statics and Dynamics of Composite Structures and Metamaterials

366 VIBRATORY ENERGY CHANNELLING BETWEEN A LINEAR AND A TIME-DEPENDENT NONLINEAR OSCILLATOR
Aurélie Labetoulle, Alireza Ture Savadkoohi, Emmanuel Gourdon

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Jean Flosi, Alireza Ture Savadkoohi, Claude-Henri Lamarque

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Camila da Silveira Zanin, Alireza Ture Savadkoohi, Sébastien Baguet, Régis Dufour

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761 Spectral design and nonlinear dispersion properties of a mechanical metamaterial with local inertia amplifiers
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Valeria Settimi, Marco Lepidi, Andrea Bacigalupo

1223 Nonlinear electro-mechanical dynamics of a piezo-composite beam rotor system
Jaroslaw Latalski, Marcin Kowalczuk, Jerzy Warminski

1331 A beam-like model for buckling and post-buckling analysis of a thin pipe
Arnaldo Casalotti, Daniele Zulli, Angelo Luongo

1966 Homogenized Model for Masonry Walls Retrofitted by Steel Fibre reinforced Mortar Coating
Simona Di Nino, Angelo Luongo

1979 Prediction of Thermal Buckling Temperature of Sandwich Plates with Lattice Core
Yuki Sebata, Kuniharu Ushijima

2841 Design Optimization of a Single-Phase Elastic Metamaterial for Enhancing Mechanical Resistance to Impact Load
Ana Vasconcelos, Dingena Schott, Jovana Jovanova, Alejandro Aragón

2908 A COMPUTATIONAL ANALYSIS FOR THE NONLINEAR MODEL OF A LAMINATED GLASS PLATE
Deniz Can Elçi, Mehmet Zülfü Aşık, Ebru Dural

3042 Auxetic metamaterial and flagstone tessellation patterns via convex Airy stress functions
Marina Konstantatou

MS0921 Advanced structural mechanics of smart and adaptive structures

740 Harnessing Bistability of Domes using Piezoelectric Actuation to achieve Patterned Sheet Structure with Adaptive Mechanical Properties and Shape
Frédéric Albertini, Gabriella Tarantino, Laurent Daniel, Konstantinos Danas

916 Two-dimensional analytical solution for multi-segmented Al/ steel- composite panel-An Aerospace Application
poonam Kumari, Viwek Kumar

1359 Origami Metamaterials with Near-Constant Poisson Functions Over Finite Strains
Siva Poornan Vasudevan, Phanisri Pratapa

1963 Mechanics of Morphable Architected Materials
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Damiano Pasini, Ruizhe Ma

2021 Experiment of a Semi-Active Electromagnetic Seismic Isolation System
Ging-Long Lin, Yi-Chun Huang, Chi-Chang Lin

2151 Sound Absorption in Semi-Closed Cellular Structures Fabricated by 3D Printer
Takeshi Shiba, Kuniharu Ushijima, Takashi Yamamoto, Takao Yamaguchi

2204 Flattening Response of Net-shaped Circular Tubes Under Pure Bending
Toshiki Nakamura, Kuniharu Ushijima

2236 Heat Transfer Characteristics of BCC lattice Core on the Heated Plate Under Impinging Flow
Shuhei Hasumoto, Kuniharu Ushijima, Kazuhisa Yuki

2238 Kinematics of an Origami Inspired Millipede Robot
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Chenying Liu, Zhong You, Perla Maiolino

2508 Investigations on novel active tristable cross-shaped laminates
B Danish, M Anilkumar P, S Suraj K, A Haldar, N Rao B

2758 Compliant Folding Hinge Structure using Radial Slit Pattern
Munkyun Lee, Tomohiro Tachi

2805 Multi-stable structures induced by pneumatically inflated pouches with laid-in origami paper pattern
Yiwei Zhang, Tomoya Tendo, Tomohiro Tachi

MS0922 Advanced computational methods for wave analysis and their application

454 Detection of Bi-Material Plate Debonding by Guided SH Waves Scattering with BEM
Supawat Wongthongsiri, Sohichi Hirose

875 Anti-plane wave scattering of anisotropic elastic materials using the MFS
Akira Furukawa, Takahiro Saitoh, Sohichi Hirose

1916 Numerical Continuation and Semi-analytical Finite Element Method for Guided Wave Dispersion Analysis
Taizo Maruyama

2105 Inverse Analysis of Wave Sources Based on Sparse Estimation
Sohichi Hirose, Ayumi Wakita, Aya Watanabe, Akira Furukawa, Takahiro Saitoh

2185 Time evolution of multiple scattering of point-like scatteres based on a Volterra type integral equation
Kaito Maruyama, Terumi Touhei

2203 Deep-learning based inverse scattering for a defect in 2-D isotropic solids
Shinji SASAOKA, Takahiro SAITOH, Sohichi HIROSE

MS0923 Modeling of Damping

1478 Numerical Evaluation of Bell-Shaped Proportional Damping Model for Softening Structures *Keynote Lecture*
Chin-Long Lee, Theodore L. Chang

1557 Modelling local energy dissipation mechanisms in the seismic response of reinforced concrete structures
Clotilde Chambreuil, Cédric Giry, Frédéric Ragueneau, Pierre Léger

MS0924 Structural Instability in Earthquake Engineering

808 Collapse Assessment of Steel Buildings with Deep Columns under Tri-directional Seismic Excitations
Hsuan-Chieh Wang, Tung-Yu Wu

1473 Influence of Position of Decks on Seismic Behaviour of Scissors-type Bridge
Yuki Chikahiro, Tomoto kometani, Ichiro Ario

2194 Effects of Longitudinal Reinforcement and Aspect Ratios on Deteriorated Hysteresis Behaviours of Reinforced Concrete Bridge Columns
Ping-Hsiung Wang, Kuo-Chun Chang, Wei-Chung Cheng

2229 Classification of Seismic Failure Modes of Deep Steel Columns Using Machine Learning
Omar Sediek, Tung-Yu Wu, Jason McCormick, Sherif El-Tawil

MS0927 RECENT ADVANCES IN RAILWAY DYNAMICS NUMERICAL MODELLING

696 Uncertainty Quantification for High-speed Train Dynamics Modeling and Optimization under Uncertainties to Limit Energy Consumption
Julien Nespoulous, Christian Soize, Christine Funfschilling, Guillaume Perrin

1877 Modelling of Innovative Yaw Dampers for Railway Vehicles
Gioele Isacchi, Francesco Ripamonti, Matteo Corsi, Ton van Dongen

1889 A methodology for including suspension dynamics in a simple context of rail vehicle simulations
Ivano La Paglia, Luca Rapino, Francesco Ripamonti, Roberto Corradi

2102 A semi-analytical method for random vibration of bogie-track-tunnel-soil interaction system
Kazuhisa Abe, Kazuki Sato, Kazuhiro Koro

2393 Assessment of the pantograph-catenary current collection quality by using indirect measurements and Artificial Neural Networks
Santiago Gregori, Manuel Tur, Jaime Gil, Javier Fuenmayor

2543 Iterative algorithm to perform HIL tests with a periodic finite element catenary model
Jaime Gil Romero, Manuel Tur Valiente, Santiago Gregori Verdú, Antonio Correcher, Francisco Javier Fuenmayor

MS0929 Nonlinear computational structural dynamics in rotating turbomachinery

480 Reduced Order Modeling of Cyclically Symmetric Bladed Disks with Geometric and Contact Nonlinearities
Elise Delhez, Florence Nyssen, Jean-Claude Golinval, Alain Batailly

946 Probabilistic Learning Based Optimization of the Detuning of Bladed-Disks in Nonlinear Stochastic Dynamics in Presence of Mistuning
Evangéline Capiez-lernout, Christian Soize

978 Nonlinear geometrical dynamics of cyclic symmetry structures: application to bladed disks
Fabrice Thouverez, Nicolas Di-Palma, Samuel Quaegebeur, Benjamin Chouvion

1023 Multi-element polynomial chaos with automatic discontinuity detection for nonlinear systems
Juliette Dréau, Benoit Magnain, Alain Batailly

MS0931 Advances of Vehicle-Bridge Interaction Dynamics

1701 Simulation of High-Speed Railway Bridges under Strong Earthquakes Using a New Dynamic Analysis Procedure
Gao Gong-Lue, Lee Tzu-Ying, Yau Jong-Dar

1980 Spatial-varying frequencies for a beam subject to a moving vehicle *Keynote Lecture*
Jong-Dar Yau

3017 Simulation of Vehicle-Bridge Interaction Using a Novel Dynamic Analysis Procedure with Geometrically Nonlinear Solid Elements
Thanh-Tu Nguyen, Tzu-Ying Lee

3040 Dynamic Simulation of Vehicle-Bridge Interaction Using a Novel Simple Analysis Procedure with Composite Time Integration Method
WEN-HSIAO HUNG

MS1001 Modeling and Simulation for Additive Manufacturing

620 Development of Adaptive Smoothed Particle Hydrodynamics Method with Focus on Additive Manufacturing Simulation
Mamzi Afrasiabi, Christof Lüthi, Markus Bambach, Konrad Wegener

639 Immersed Boundary Methods for Laser Powder Bed Fusion Process Simulations
Massimo Carraturo, Stefan Kollmannsberger, Alex Viguerie, Ernst Rank, Alessandro Reali, Ferdinando Auricchio

737 Multiscale Computational Model for Microscale Residual Stress and Dislcoation Dynamics in Addtively Manufactured 316L Stainless Steel
Daijun Hu, Nicolò Grilli, Wentao Yan

746 Simulation of keyhole dynamics and keyhole pore formation during metal additive manufacturing
Lu Wang, Wentao Yan

791 Numerical and Experimental Analysis of Additively Manufactured Particle Dampers
Honghu Guo, Akihiro Takezawa

850 Modelling and validation of Selective Laser sintering of PA12
Kenneth Meinert, Mohamad Bayat, Jesper Henri Hattel, David Bue Pedersen

1017 Physically based bead topology model coupled with electro-mechanical power source model applied for wire and arc additive manufacturing
Chetra Mang, Xavier Lorang, Ramdane Tami, François Rouchon

1115 High-Fidelity Multi-Physics Modeling of Process-Structure-Property Relationships in Additive Manufacturing *Keynote Lecture*
Wentao Yan

1165 Numerical simulation of 3D laser surface melting and polishing processes
Alexandre Caboussat

1168 Simulating Steering-Induced Defects in Composites Additive Manufacturing
Yi Wang, Sarthak Mahapatra, Jonathan Belnoue, Dmitry Ivanov, Stephen Hallett

1182 Synthetic Volume with Statistical Copy of Additive Manufactured Sample for 3D Crystal Plasticity Simulations
Dmitry Bulgarevich, Masakazu Tsujii, Tomoki Hiraga, Masahiko Demura, Makoto Watanabe

1312 Data-driven analysis of microstructure-property linkages for additively manufactured materials
Alexander Raßloff, Paul Seibert, Benjamin Schmidt, Robert Kühne, Martina Zimmermann, Markus Kästner

1424 Phase-field simulation of melting and solidification of Al-Si hypoeutectic alloy under solidification conditions for powder bed fusion
Masayuki Okugawa, Yuta Ohigashi, Yuya Furushiro, Yuichiro Koizumi

1479 A Design Digital Twin For Metallurgical Process Development In Directed Energy Deposition Additive Manufacturing *Keynote Lecture*
Jakub Mikula, Robert Laskowski, Rajeev Ahluwalia, Yingzhi Zeng, Kewu Bai, Ramanarayan Hariharaputran, Stephen Wan, My Ha Dao, Guglielmo Vastola, Yong-Wei Zhang

1642 Phase-field study of precipitation from solute segregation in IN738LC Ni-based superalloy solidified under conditions for powder bed fusion additive manufacturing
Makoto Wakabayashi, Masayuki Okugawa, Yuichiro Koizumi

1813 Crystal Introducing Mechanism in Laser Wire Directed Energy Deposition Fabricated Ti6Al4V
Jinghao Li, Mathieu Brochu, Yaoyao Fiona Zhao

1866 Reduction of thermal distortion of laser powder bed fusion based on sequential inherent strain method
Akihiro Takezawa, Qian Chen, Albert To

1981 Phase-field study of segregations in Ni-based superalloys solidified under conditions typical of powder bed fusion additive manufacturing
Kazufumi Nose, Kenji Saito, Masayuki Okugawa, Yuichiro Koizumi

2055 Multi-scale Analysis for Microstructure Evolution in Powder Bed Fusion Process
Sukeharu Nomoto, Makoto Watanabe

2445 Additive Manufacturing: From Nonequilibrium Interfaces to Strange Grains
Peter Voorhees, Alexander Chadwick, Arnab Mukherjee, James Warren

2599 Physics-based nozzle design for optimal liquid metal jetting via multiphase flow simulation
Jongmin Seo, Svyatoslav Korneev, Christoforos Somarakis, Adrian Lew, Morad Behandish

2620 A mixed interface-capturing and interface-tracking CFD framework for modeling metal AM processes at different scales
Jinhui Yan

2757 Nanoparticle-enhanced absorptivity of copper during laser powder bed fusion
Adrian Lew, Wei Cai, Wendy Gu, Philip DePond, Ottman Tertuliano, Manyalibo Matthews, David Doan

3079 Space-time formulation for heat evolution in laser based powder bed fusion
Stefan Kollmannsberger, Philipp Kopp, Vijaya Holla, Jonas Grünewald, Victor Calo, Ernst Rank, Katrin Wudy

3091 Development of a Process Simulator thru GPU Acceleration and Adaptive Remeshing for Studying Porosity Variation in Laser Power Bed Fusion
Albert To, Alaa Olleak, Florian Dugast

3114 A semi-analytical thermal modelling approach for multilaser powder bed fusion *Keynote Lecture*
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