



INSA | INSTITUT NATIONAL
DES SCIENCES
APPLIQUÉES
LYON

2019 EMI International Conference

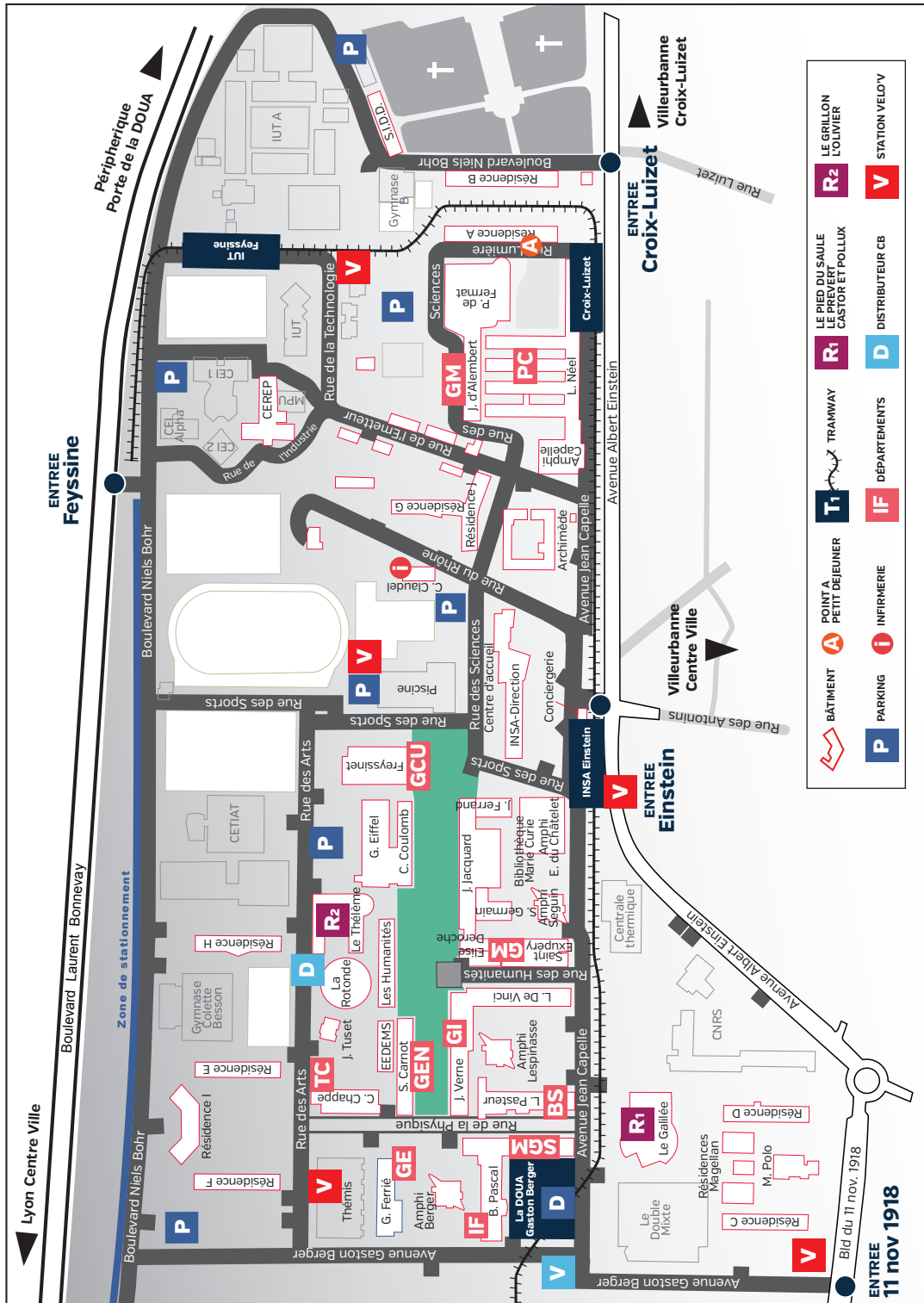
Engineering Mechanics Institute

Conference Program



 GEOMAS

JULY 3 – 5, 2019 LYON, FRANCE



Map of the Campus

Welcome!

On behalf of the Steering Committee, the Local Organizing Committee and the International Scientific Committee, I would like to welcome you on La Doua Campus at INSA Lyon – France.

We are proud to host the fifth EMI International Conference following the 2015 Conference hosted by the Hong Kong Polytechnic University, 2016 Conference hosted by University of Lorraine France, EMI2017 International Conference in Rio de Janeiro, Brazil, 2018 Conference hosted by Tongji University that the Engineering Mechanics Institute (EMI) of the American Society of Civil Engineers (ASCE) organized outside the United States. This important event will be taking place for the second time in Europe.

2019 EMI International Conference feature about 200 oral presentations in the 27 Mini-Symposia organized in parallel sessions. The participants come from the six continents, with high participation of young researchers and PhD students who will have a great opportunity to exchange on an international platform.

The Plenary lectures will be given by five highly distinguished leading researchers covering a large scope of hot topics in Civil, Mechanical and Material Engineering. Several keynote lectures are given within the mini-symposia by leading researchers in their research field so all together a large number of topics will be covered during the conference.

A mini-Symposium “Mechanics of Granular and Clay Materials” is organized in honor of Professor Pierre-Yves Hicher, Emeritus Professor et Ecole Centrale de Nantes, France.

A joint workshop on Horizon 2020 calls for “materials, processes, nano and energy efficient building” is organized by the National contact point and the European Commission (Anne de Baas, Project Officer).

We would like to take this opportunity to express our sincere gratitude to all colleagues and friends who helped in the organization of the Conference, the EMI Board of Governors, Prof. George Deodatis - EMI President, Dr. Amar Chaker - EMI Director, and Ms Verna Jameson – EMI Senior Manager for the assistance they provided and of course to INSA Lyon for the support and for hosting this Conference.




A special thanks to the Plenary Speakers, Mini-Symposia Organizers, Sessions Chairs and all the participants of the conference.

We wish you a very fruitful Conference and a pleasant stay in Lyon!

Marie-Christine Baietto, Salim Belouettar, Ali Daouadji, Zhenyu Yin

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Program

Program at a glance

Tuesday, July 2, 2019

16:30 - 19:00, Registration

17:00 - 19:00, Ice Breaker at INSA Lyon

Wednesday, July 3, 2019

08:00 - 16:30, Registration

08:00 - 08:30, Welcome session

08:30 - 09:30, Plenary lecture 1: Prof. Cherbal FARHAT

09:30 - 10:30, Plenary lecture 2: Prof. Patrick SELVADURAI

10:30 - 11:00, Coffee break

11:00 - 12:30, Parallel sessions

12:30 - 14:00, Lunch

14:00 - 15:30, Parallel sessions

15:30 - 16:00, Coffee break

16:00 - 17:30, Parallel sessions

19:00 - 21:00, Welcome Reception at on campus (Hotel de Ville – cancelled)

Thursday, July 4, 2019

08:00 - 12:30, Registration

08:30 - 09:30, Plenary lecture 1: Dr Anne de BAAS

09:30 - 10:30, Plenary lecture 2: Prof. Ferdinando AURICCHIO

10:30 - 11:00, Coffee break

11:00 - 12:30, Parallel sessions

12:30 - 14:00, Lunch

14:00 - 15:30, Parallel sessions

15:30 - 16:00, Coffee break

16:00 - 17:30, Parallel sessions

18:30 - 19:30, Social Hour at *Salle de la Corbeille – Palais de la Bourse (Lyon)**

19:30 - 22:30, Banquet at *Salle de la Corbeille – Palais de la Bourse (Lyon)**

Friday, July 5, 2019

09:00 - 10:00, Plenary lecture 1: Prof. François TROCHU

10:00 - 10:30, Coffee break

10:30 - 12:00, Parallel sessions

12:00 - 12:30, Closure

12:30 - 14:00, Lunch

*Palais de la Bourse is located close to exit Metro Cordeliers (Metro Line A – Red line)

| 8:00-8:30 | 8:30-10:30 | 10:30-11:00 | 11:00-12:30 | 12:30-14:00 | 14:00-15:30 | 15:30-16:00 | 16:00-17:30 | | 18:30-20:00 | 19:30-22:00 |
|-----------------------------------|--------------------------------|--------------|-------------------|-------------|-------------------|--------------|-------------------|--|-------------------|----------------|
| Tuesday (July 2, 2019) | | | | | | | | | | |
| <i>Registration (14:00-19:00)</i> | | | | | | | | | | |
| <i>Ice Breaker (17:00-19:00)</i> | | | | | | | | | | |
| Wednesday (July 3, 2019) | | | | | | | | | | |
| <i>Registration (8:00-16:00)</i> | | | | | | | | | | |
| Opening session | Plenary Lecture 1 Lecture 2 | Coffee break | Parallel Sessions | Lunch | Parallel Sessions | Coffee break | Parallel Sessions | | Welcome Reception | |
| Thursday (July 4, 2019) | | | | | | | | | | |
| <i>Registration (8:00-16:00)</i> | | | | | | | | | | |
| | Plenary Lecture 1 Lecture 2 | Coffee break | Parallel Sessions | Lunch | Parallel Sessions | Coffee break | Parallel Sessions | | | Banquet Dinner |
| Friday (July 5, 2019) | | | | | | | | | | |
| <i>Registration (8:00-16:00)</i> | | | | | | | | | | |
| | Plenary Lecture 1 Lecture 2 | Coffee break | Parallel Sessions | Lunch | | | | | | |

List of Mini-symposia

MS1 : From capillary bonds to immersed granular flow

(Chairs: Jean-Yves Delenne, Farhang Radjai, Anthony Wachs)

MS2 : Suffusion Process and Mechanical Behavior

(Chair: Zhenyu YIN)

MS3 : Induced Seismicity

(Chairs: Nathalie CASAS, Guilhem Mollon)

MS4 : Mini-Symposium(*) in Honour of Professor Pierre-Yves HICHER

(Chairs: Daouadji Ali, Zhenyu YIN)

MS5 : Recent Advances in the Behavior of Granular Materials

(Chairs: Christophe Dano, Pierre-Yves Hicher)

MS6 : Computational and Analytical Methods in Geomechanics

(Chairs: Siegfried Maiolino, Frederic Pellet)

MS7 : Resilient Behavior Modelling of Granular Based Materials

(Chair: Cyrille Chazallon)

MS8: Poromechanical Couplings in Geomaterials and Geostrutures

(Chairs: Antonin Fabbri, Jean-Michel Pereira, Henry Wong)

MS9 : Enriched Continuum Mechanics and Bridging Different Scales

(Chairs: Angela Madeo, Patrizio Neff)

MS10 : Biomechanical Modeling of the Human

(Chairs : Yoann LAFON, Karine Bruyère, bertrand Frechede, Raphaël Dumas, Sonia Duprey, Laure-Lise Gras, Laura Dubuis, Mélanie Ottenio, aline Bel Brunon)

MS11 : Innovative Materials for Sustainable Construction

(Chairs : Elodie Prud'homme, Geneviève Foray, Martin Cyr, Hubert Rahier, Aveline Darquennes)

MS12 : High Temperature Effects on the Dynamic Strength of Concrete

(Chairs: LEVON AVETISYAN, Ashot Tamrazyan)

MS14 : Thin Textile (and Fiber) Reinforced Cement Composites and Ferrocement

(Chairs: AMIR SILARBI, Tine Tysmans, CORINA PAPANICOLAOU)

MS18 : Machine Learning and Informatics for Materials Discovery and

(Chairs: Mathieu Bauchy, N M Anoop Krishnan)

MS19 : Stability and failure of structures and materials

(Chairs: Noël Challamel, Wadee Ahmer)

MS20 : Towards the Next Generation of Smart Structures

(Chair: Mariantonieta Gutierrez Soto)

MS22 : Robustness of Infrastructures

(Chairs: Simos Gerasimidis, George Deodatis)

MS23 : Shell Buckling

(Chairs: Simos Gerasimidis, Pedro Reis)

MS24 : Vibration Control of Structures Under Multiple Hazards

(Chairs: Said Elias Rahimi, Aly-Masoud Aly, Vasant Matsagar, Rajesh Rupakhety)

MS25 : Current Challenges in Multiscale Mechanics - From Materials to Structures

(Chairs: Christian Hellmich, Stefan Scheiner, Bernhard Pichler)

MS26 : Linear and Nonlinear Vibrations of Complex Structures

(Chairs: El Mostafa Daya, Hakim Boudaoud, Guillaume Robin)

MS27 : Effects of Manufacturing on the Mechanical Performance of Composites

(Chair: de Luca Patrick)

MS28 : Dynamic behaviour of Geomaterials

(Chairs: BRARA Ahmed)

MS29 : COMPOSELECTOR H2020 Project

(Chairs: BELOUETTAR Salim, KAVKA Carlos , PATZAK Borek , KOELMAN Hein)

MS30 : High Performance Structural Polymer-based Composites and Their Related Applications

(Chairs: DAVID RUCH, Henri PERRIN, BELOUETTAR Salim)

MS34 : Multiscale and multiphysics approaches for durability of construction materials and structures

(Chairs : Ariane Abou Chakra, Laurie Lacarrière)

MS35 : Other EMI' interest papers

(Chairs: DAOUADJI Ali, BELOUETTAR Salim)

Plenary Speakers



Prof. Charbel FARHAT, Stanford University, USA

Charbel FARHAT is the Vivian Church Hoff Professor of Aircraft Structures, Chairman of the Department of Aeronautics and Astronautics, and Director of the Stanford-KACST Center of Excellence for Aeronautics and Astronautics at Stanford University. His research interests are in computational engineering sciences for the design and analysis of complex systems in aerospace, mechanical, and naval engineering. He is a Member of the National Academy of Engineering, a Member of the Royal Academy of Engineering (UK), a Member of the Lebanese Academy of Sciences, a Doctor Honoris Causa from Ecole Centrale de Nantes, a Doctor Honoris Causa from Ecole Normale Supérieure Paris-Saclay, a designated ISI Highly Cited Author, and a Fellow of AIAA, ASME, IACM, SIAM, USACM, and WIF. He has trained more than 90 PhD and post-doctoral students. For his research on aeroelasticity, aeroacoustic scattering, CFD, dynamic data-driven systems, fluid-structure interaction, high performance computing, and model reduction, he has received many professional and academic distinctions including: the Ashley Award for Aeroelasticity and the Structures, Structural Dynamics and Materials Award from AIAA; the Lifetime Achievement Award and the Spirit of St Louis Medal from ASME; the Gordon Bell Prize and the Sidney Fernbach Award from IEEE; the Gauss-Newton Medal from IACM; the Grand Prize from the Japan Society for Computational Engineering Science; and the John von Neumann Medal from USACM. He was knighted in France in the Order of Academic Palms, and awarded the Medal of Chevalier dans l'Ordre des Palmes Académiques.



Prof. Patrick SELVADURAI, Mc Gill University, Canada

Dr. A.P.S. SELVADURAI is currently William Scott Professor and Distinguished James McGill Professor in the Department of Civil Engineering and Applied Mechanics. He obtained his Ph.D. degree in Theoretical Mechanics from the University of Nottingham, under the tutelage of the eminent continuum mechanist the late Professor A.J.M. Spencer FRS, for research in the area of "Non-linear Elasticity" and in 1986 the D.Sc. in Theoretical Mechanics for research into "*Mathematical Modelling of Problems in Geomechanics and Elastomechanics*". He joined the Department of Civil Engineering at Carleton University, Ottawa, Canada in 1975 as Assistant Professor, became Professor in 1981 and Head of the Department from 1982 to 1991. In 1993, he was invited by McGill University to become Chair of the Department of Civil Engineering and Applied Mechanics, a position he held until 1997.

In 1991, Dr. Selvadurai received the *Inaugural Horst Leipholtz Medal* of the Canadian Society of Civil Engineering and in 1993 the *Engineering Medal for Research and Development* of The Professional Engineers of Ontario. In 1998, Dr. Selvadurai received the *Humboldt Forschungspreis* (Humboldt Foundation of Germany), given to internationally acclaimed scientists and engineers. In 2000, he became the first civil engineer to be awarded the *Killam Research Fellowship Canada Council for the Arts*, one of Canada's most distinguished research awards. In 2001 he was awarded the *Inaugural John Booker Medal* of the International Association for Computer Methods and Advances in Geomechanics-IACMAG. In 2003 he received the prestigious *Max Planck Forschungspreis in the Engineering Sciences*. In 2007, he was awarded the *Killam Prize in Engineering* from the Canada Council for the Arts and the *Gold Medal of the Canadian Congresses of Applied Mechanics*. In 2008 he received the *IACMAG Medal for Outstanding Accomplishments in Geomechanics*. In 2010, he was awarded the *ALERT Research Medal*, by the Alliance of Laboratories in Europe for Research and Technology. In 2013, he was awarded the *Eric Reissner Medal* of the ICCES and the *Maurice A. Biot Medal* of the ASCE. In 2017 he was awarded the *C.S. Desai Medal* of the IACMAG for outstanding contributions to computational geomechanics.



Dr Anne de BAAS, Programme Officer EC RTD LEIT NMBP, European Commission

Anne Francisca de BAAS, Dutch from origin received a physics education in Eindhoven, Utrecht and Delft in the Netherlands and a MBA in Brussels, Belgium. She has been working at the European Commission since 1992 in DG CNECT and DG RTD.

Most recently, she works on ontologies and ontology-base market places for both materials modelling and materials and manufacturing data. These market places target to share and re-use knowledge generated in EU projects and elsewhere.

Her former responsibilities have included the organisation of best practice activities and technology transfer programs and responsibility for benchmarking of industrial software applications. Economic and technical business analyses of 2800 European industries, ensuring return of investment in research and development resulting in the selection of 600 projects. The best practice extracted is documented in a booklet called 'management of economic issues' and accompanied by a booklet on how to manage outsourcing of research called 'dealing with subcontractors' (www.fuse-network.com). She wrote a brochure on Road-Mapping, the work with Network of Excellences and on metamaterials all available on http://ec.europa.eu/research/industrial_technologies/index_en.html



Prof. Ferdinando AURICCHIO, University Pavia, Italy

After a Bachelor degree in Civil Engineering at the University of Napoli, Italy (1989), a Master of Science (1991) and a Ph.D. (1995) at the University of California at Berkeley, USA, since 2001 Ferdinando AURICCHIO is professor of Solids and Structural Mechanics at the University of Pavia, Italy, where he started to develop strong collaborations with the Department of Mathematics (being also a Research Associate at IMATI-CNR Pavia) and with several medical institutions.

He received the Euler Medal by ECCOMAS (European Community of Computational Methods in Applied Sciences) in 2016 and he became Fellow Award by IACM (International Association for Computational Mechanics) since 2012. Since 2013 he is Vice-President of ECCOMAS.

In 2018 he was appointed as a member of the Italian National Academy of Science, known also as Accademia dei XL.

Major research interests are the development of numerical schemes (in particular, finite element methods, both for solids and fluids, with a particular attention to innovative materials), the development of simulation tools to support medical decision (in particular, for cardiovascular applications), and more recently everything that is related to additive manufacturing. In fact, he has organized a 3D-printing lab, exploring new materials, new printing technologies, new uses of 3D printing, ranging from civil engineering 3D printed concrete beams to bio-manufacturing.



Prof. François TROCHU, Ecole Polytechnique Montreal, Canada

Dr. François TROCHU is professor of Mechanical Engineering at École Polytechnique de Montréal. After graduation in 1974 from École Polytechnique in Paris, he obtained his Master's degree under the supervision of Dr. J. T. Oden in Aerospace Engineering at the University of Texas at Austin in 1975. In 1990, he received his Ph.D. from École Polytechnique, Montreal, on the development of random finite elements and the application of kriging to groundwater flows in porous media. Since 1990, F. Trochu is Professor in the Mechanical Engineering Department of École Polytechnique de Montréal and has published over 100 papers on composite manufacturing in scientific journals. Actively involved for nearly 30 years in applied research in Liquid Composite Molding (LCM), Professor Trochu is the creator of the commercial software PAM-RTM developed to simulate the Resin Transfer Molding (RTM) process with over 100 users worldwide. Professor Trochu held from 2003 to 2017 a Tier I Canada Research Chair on High Performance Composites and between 2005 and 2015 two successive Industrial Research Chairs on composite manufacturing by resin injection with General Motors (GM) and Safran.

Plenary Lectures

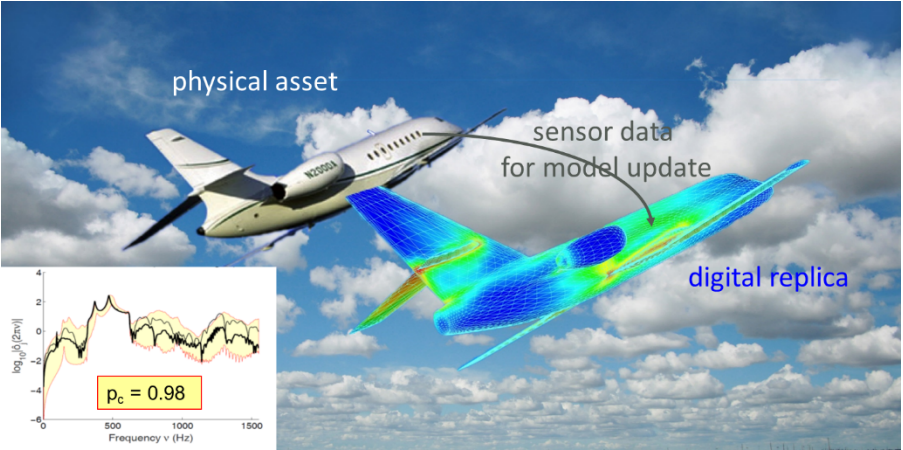
Plenary Lecture: Wednesday July 3, 8:30 – 9:30 AM
Amphitheater SEGUIN

Feasible Data-Driven Probabilistic Modeling/Learning for Digital Twins

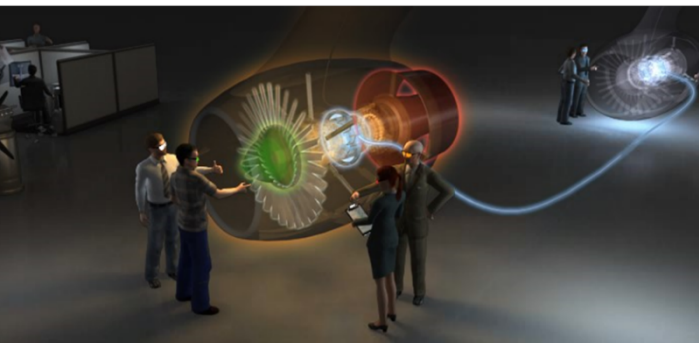
Charbel Farhat

Department of Aeronautics and Astronautics
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 Stanford University, Stanford, CA 94305, USA

A digital twin refers to a digital replica of an asset – whether a physical platform or a process – that can be used, for example, to optimize in near real-time the operation and/or life cycle management of this asset, or more generally, to drive the Intelligent Enterprise by linking



engineering and operations such as maintenance. The advocated enabler of such a computational capability is the integration of artificial intelligence, machine learning, and software analytics with data to create living digital simulation models that update and change as their physical counterparts change. Specifically, early forms of digital twins appear to be based on the integration of data analytics with model-based prediction of a few, scalar, quantities of interest (QoIs). In this lecture however, the issue of whether a system can be represented reliably by a few QoIs will be raised. Then, a more robust approach for realizing a digital twin based on adaptable, stochastic, low-



order but high-fidelity computational models will be presented. This approach integrates physics-informed machine learning techniques, probabilistic reasoning, and data-driven thinking with projection-based model order reduction to construct stochastic, hyperreduced, computational models that can operate in real time and self-adapt using data

extracted from physical sensors. Two sample digital twins constructed using this proposed approach – one for a small-scale replica of an X-56 type aircraft and one for a three-dimensional MEMS device – will be presented, and their real-time performance will be illustrated and analyzed.

Plenary Lecture: Wednesday July 3, 9:30 – 10:30 AM
Amphitheater SEGUIN

Poro-Hyperelasticity: The Mechanics of Fluid-Saturated Soft Tissues

A.P.S. Selvadurai

William Scott Professor and Distinguished James McGill Professor
Department of Civil Engineering and Applied Mechanics
McGill University
Montréal, QC, Canada H3A 0C3

Abstract

The lecture presents the formulation of the mechanics of a fluid-saturated porous medium where the porous skeleton can undergo hyper-elastic deformations. The modelling has potential applications in the study of highly deformable biological tissues including brain matter, synthetic materials impregnated with fluids and highly deformable porous solids used as tactile sensors, where the fluid can be the air present in the void space. Conventional treatments of soft biological materials assume the applicability of classical hyperelasticity. The presence of the saturating fluid, however, completely changes the character of the modelling approach, in that the partitioning of stresses between the fluid and the porous skeleton needs to be addressed. The flow of the saturating fluid, induced by hydraulic gradients, is an added consideration. The presentation summarizes recent analytical results for canonical problems involving one-dimensional strains, pure shear and expansion of annuli. The role of these developments in the validation of computational schemes that can ultimately be used in the solution of problems with complex geometries is also discussed. The material presented in the plenary lecture is a summary of recent articles [1-4] on the topic.

References

- [1] Selvadurai, A.P.S. and Suvorov, A.P. (2016) Coupled hydro-mechanical effects in a poro-hyperelastic material, *Journal of the Mechanics and Physics of Solids*, 91: 311-333.
- [2] Suvorov, A.P. and Selvadurai, A.P.S. (2016) On poro-hyperelastic shear, *Journal of the Mechanics and Physics of Solids*, 96: 445-459.
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Plenary Lecture: Thursday July 4, 8:30 – 9:30 AM
Amphitheater SEGUIN

Constituency building and standardisation in the NMBP programme: physics-based modelling and data sharing

Dr Anne de BAAS
Programme Officer EC RTD LEIT NMBP
European Commission

Abstract

Horizon Europe, the next frame work programme, will deal with Big Data and Artificial Intelligence. In order to prepare that the NMBP Programme will prepare Industry Commons. In the WP2020 there will be two Calls (to be launched in July 2019) on data sharing. One call will deal with ontologies in materials and manufacturing. The other will create a market place for NMBP-related data.

The state of the art in data documentation in the modelling area (MODA) and characterisation area (CHADA) will be presented. The modelling market place, a forerunner of the Industry Commons market place, will be presented. The European Materials Modelling Council will be shown as a good example of constituency building with its successful scope of joint activities.

Plenary Lecture: Thursday July 4, 9:30 – 10:30 AM
Amphitheater SEGUIN

Additive Manufacturing: modeling and computational challenges!!

Ferdinando Auricchio

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Email: auricchio@unipv.it*

Additive Manufacturing (AM) – also known as 3D printing – is taking off in many industrial processes. In particular, powder bed fusion for metal manufacturing has definitively changed the way of prototyping metal parts but also plastic 3D printing is changing many approaches in modern engineering.

However, AM is a complex physical process, involving different phenomena, e.g., heat conduction, phase change, surface change, and residual stress rising; accordingly, it is a complex coupled thermo-mechanical problem and simulation is fundamental to predict temperature distribution and stresses during and after the printing process.

After a general introduction to the technology and to possible applications, the presentation will focus on some new approaches to describe the complex physics occurring during the manufacturing process as well as on optimization problems associated to the freedom which is possible thanks to additive manufacturing. The presentation will try to highlight unresolved issues and open possible research directions.

Plenary Lecture: Friday July 5, 9:00 – 10:00 AM
Amphitheater SEGUIN

Fabrication of High Performance Parts by Liquid Composite Molding and Application to Polymer Based Composites

François Trochu, Professor

Département de génie mécanique
École Polytechnique de Montréal, Canada

Liquid Composite Molding (LCM) regroups a family of manufacturing processes to fabricate high performance composites based on injecting a liquid phase through a solid porous material. When the liquid cools down, evaporates or chemically reacts, a composite part is created by the combination of two phases. An increasing number of industrial applications are now in production or currently developed to fabricate polymeric, metallic or ceramic composites. The theoretical background to model these processes is based on two basic laws governing liquid flows and consolidation in porous materials pioneered in Civil Engineering by Darcy and Terzaghi. Permeability turns out to be a key parameter to model liquid injection processes through fibrous reinforcements. This presentation aims to show how the scientific background developed initially in Civil Engineering was successfully applied to composite manufacturing.

The concept of permeability can be extended from the classical saturated permeability of Darcy's law to model different polymer based injection processes such as *Resin Transfer Molding (RTM)*, *Vacuum Assisted Resin Infusion (VARI)* or *Liquid Resin Infusion (LRI)*, namely resin infusion with distribution media. Several examples of application to polymer composites will be presented to illustrate how the unsaturated, equivalent, flexible and apparent permeability have been used successfully or are being considered to simulate reactive resin flows through porous materials and fabricate high performance aircraft, automotive, marine or wind energy composites. Current challenges encountered in *Liquid Injection Molding* will also be discussed. In particular, the use of granular materials appears promising to create adaptive molds and reduce tooling costs. This is especially necessary to make parts of large dimension such as ship hulls or wind blades. It is the case also for many infrastructure applications. Granular materials have been investigated for a long time in Soil Mechanics. It turns out that they can provide a unique material for composite tooling because they can deform, and at the same time, if needed, provide rigidity under vacuum. Examples of adaptive injection technology will be presented.

Mini-Symposium Honoring Pierre-Yves Hicher

Thursday July 4th 2019, 14h00 - 17h30
 Amphitheater Emilie du Châtelet
 Library Marie Curie (BMC)

Mechanics of Granular and Clay Materials
A mini-symposium honoring Professor Pierre-Yves Hicher



Dr. Pierre-Yves Hicher

Emeritus Professor since 2015
EMI Fellow

Former Director of the Research Institute in Civil and Mechanical Engineering at the Ecole Centrale de Nantes

Pierre-Yves Hicher is a distinguished research scholar and teacher in engineering mechanics and geomechanics whose outstanding contributions to these fields are recognized world-wide.

His work has improved understanding and enriched the body of knowledge about the mechanical behavior of soils and granular materials mainly through having developed methodologies for connecting macroscopic properties to the microstructure of complex heterogeneous materials.

Among his major contributions can be cited the original experimental procedures and parameter identification methods under inverse analysis techniques, the homogenization techniques for modeling the mechanical behavior of disordered granular materials, and more recently, the practical criteria and models for addressing internal erosion in geomaterials with specific attention to landslides and the stability of hydraulic works.

After starting his professional career as a consultant in offshore oil structures and nuclear waster disposal in deep clay clayers, Dr.Hicher turned his attention to research projects which resulted in the publication of nearly 100 articles in peer-reviewed journals with over 4000 citations, 8 books and over 80 conference articles and presentations. He has supervised the work of 38 PhD students in the fields of soil mechanics, foundation engineering, granular materials, constitutive modeling and numerical modeling, and he is a reviewer for many international journals.

These facts and figures, impressive as they seem, do not fully reflect the breadth and spirit of Pierre-Yves's total contribution to academia and engineering. The missing information concerns above all his extraordinary humaneness as a scientist and a mentor to numerous students and colleagues.

It must also be noted that Pierre-Yves Hicher 's fundamental contributions to granular micro-mechanics and constitutive modeling have brought resolutions to practical and complex problems in geomechanics often considered "dirty".

These problems, which were largely ignored by the engineering mechanics researchers in the heyday of his career, include micro-mechanical analysis of clays; characterizing the effects of particle breakage; developing rational methods for analyzing particle suffusion; analyzing clay swelling, partially saturated soils, and grouted and naturally cemented sands; developing micro-mechanical analyses of in situ testing and of the cyclic hardening of soils.

Each of these problems has now become a subject of engineering interest and scientific scrutiny, thanks in no small part to Dr. Hicher's devoted efforts to the soil mechanics community.

(written by Ali Daouadji, Matthew Kuhn, Angelika Lee)

List of confirmed speakers

| | |
|------------|-------------|
| Félix | DARVE |
| Bernard | CAMBOU |
| Edouardo | ALONSO |
| Patrick | SALVADURAI |
| David | MUIR WOOD |
| Richard | WAN |
| Antoinette | TORDESILLAS |
| Jianfu | SHAO |
| Wei | Wu |
| Farhang | RADJAI |
| François | NICOT |
| Farid | LAOUAFA |
| Olivier | MILLET |
| Cyrille | CHAZALLON |
| Christophe | DANO |
| Chaofa | ZHAO |
| Xianfeng | LIU |
| Dongmei | Zhang |
| Zhenyu | YIN |
| Ali | DAOUADJI |

List of mini-Symposia