

# **1<sup>st</sup> POLYTECHNICA SYMPOSIUM &** USP Strategic Workshops on *Engineering Grand Challenges*

**August, 6<sup>th</sup> – 7<sup>th</sup>, 2018; São Paulo, Brazil**

## **Objectives**

The workshop will take place at the Polytechnic School of the University of São Paulo.

The main goal of this event is to bring together important international scientific leaders in all branches of engineering, to discuss engineering grand challenges that engineering will face in the next decades. The event will carry six or seven keynote speakers, which will cover major issues associated to the engineering, and discussion sections. The event aims to provide an environment for discussion on the major topics of engineering over the next decades in all their perspectives, from technical and scientific challenges to the social impact of technologies. All the speakers will make presentations on their perception on those issues, fomenting discussions afterwards. It will also mark the release of the first number of the journal Polytechnica, published by the Springer-Nature International. The speakers have been invited to write full papers for the first issue of this new journal.

## **Target Public**

The event marks the release of the first issue of the Springer journal Polytechnica. This journal presents an innovative perception for the specialized literature, providing a space for the discussion on the grand themes of engineering in all its branches, with an interdisciplinary tone, taking into account the interconnections among those branches. Therefore, it is expected that this workshop will attract much attention of leaders from academic and industrial institutions worldwide. It is expected a target of about 200 attendees. Additionally, since the event will take place at the Polytechnic School of the University of São Paulo, it is expected a massive participation of researchers, faculty and graduate students from this institution.

The event will reach a broad audience of specialists and non-specialists, since it will be transmitted live in the Youtube channel of the University of São Paulo. Additionally, all the presentations will be recorded and available in Youtube channel. Therefore, the event will have a major impact in a long period.

## **Organizers & Committees**

### **Honorary President:**

José Goldemberg (Technical Committee Chair)  
University of São Paulo, Brazil

**Chair:** Emilio Carlos Nelli Silva  
Polytechnic School of University of São Paulo, Brazil

**Co-Chair:** José Roberto Castilho Piqueira  
Polytechnic School of University of São Paulo, Brazil

### **Local Committee:**

João Francisco Justo Filho  
Polytechnic School of University of São Paulo, Brazil

José Reinaldo Silva  
Polytechnic School of University of São Paulo, Brazil

Júlio Romano Meneghini  
Polytechnic School of University of São Paulo, Brazil

Liedi Légi Bariani Bernucci  
Polytechnic School of University of São Paulo, Brazil

Luis Furtado  
Polytechnica Publisher, Springer/Nature

Vanderley Moacyr John  
Polytechnic School of University of São Paulo, Brazil

### **Advisory Scientific Committees:**

Andrew Allen – National Institute of Standards and Technology (NIST), U.S.A.

Andrew Alleyne – University of Illinois at Urbana-Champaign, U.S.A.

Gi Ho Yoon – Hanyang University, South Korea

Glaucio H. Paulino – Georgia Institute of Technology, U.S.A.

Jim N. Reddy – Texas A&M University, U.S.A

Li Ju – Massachusetts Institute of Technology (MIT), U.S.A.

Lucio Soibelman – University of Southern California, U.S.A.

Markus Lienkamp – Technische Universität München (TUM), Germany

Roberto Salmeron – Ecole Polytechnique, France

Shimon Y. Nof – Purdue University, U.S.A.

Shinji Nishiwaki – Kyoto University, Japan

Takashi Maekawa – Yohohama University, Japan

Tetsuo Tomiyama – Cranfield University, United Kingdom

## Keynote Speakers

- Lucio Soibelman

*Current Address:*

University of Southern California, U.S.A.

*Title of Presentation:*

Design, Construction and Management for Data Rich Advanced Infrastructure Systems

*Page:*

<https://pressroom.usc.edu/lucio-soibelman/>

*Biography:*

Ph.D., Civil Engineering Systems, Massachusetts Institute of Technology (1998)

M.Sc., Civil Engineering, Universidade Federal do Rio Grande do Sul (1993)

B.S., Civil Engineering, Universidade Federal do Rio Grande do Sul (1984)

Chair of the Sonny Astani Department of Civil and Environmental Engineering, USC Viterbi School of Engineering

*Research Areas:*

Smart infrastructure (transportation, water and waste management), energy efficient buildings, process integration in large-scale engineering systems, artificial intelligence, data and text mining, construction and operation of civil engineering systems

- Shinji Nishwaki

*Current Address:*

Kyoto University, Japan

*Title of Presentation:*

Topology Optimization for Fluid Mechanics Problems

*Page:*

<http://www.osdel.me.kyoto-u.ac.jp/english/>

*Biography:*

B. S., Precision Engineering, Kyoto University

M. S., Precision Engineering, Kyoto University

Ph. D., Mechanical Engineering and Applied Mechanics, University of Michigan

Professor of Manufacturing Engineering, Kyoto University

*Research Areas:*

Theoretical development of structural optimization methods, Conceptual design methods for mechanical products, Digital engineering techniques such as the finite element method, Product design and manufacturing methods based on universal design concepts, Research on quantitative evaluation methods of intellectual property and patent

- Shimon Y. Nof

*Current Address:*

Purdue University, U.S.A.

*Title of Presentation:*

From Industry 4.0 to Production 5.0

*Page:*

<https://engineering.purdue.edu/~nof/>

*Biography:*

B.Sc., Industrial Engineering & Management (Human-Machine Systems), Technion University, Haifa, Israel

M.Sc., Industrial Engineering & Management (Human-Machine Systems), Technion University, Haifa, Israel

Ph.D., Industrial & Operations Engineering, University of Michigan, Ann Arbor

Professor of Industrial Engineering, Purdue University

Director of the NSF-industry supported PRISM Center (Production, Robotics and Integration Software for Manufacturing & Management), Purdue University

*Research Areas:*

Collaborative robotics, e-Work and e-Service for cyber-physical systems; Integrated production, supply, and service systems; Augmented, collaborative intelligence and decision support networks; Automation of nano and micro sensor networks; Systems security, integrity, and assurance

- Glaucio H. Paulino

*Current Address:*

Georgia Institute of Technology, U.S.A.

*Title of Presentation:*

Origami engineering: from deployable structures to configurational metamaterials

*Page:*

<https://paulino.ce.gatech.edu/>

*Biography:*

B.S., Civil Engineering, University of Brasilia, Brazil (1985)

M.S., Civil Engineering, PUC-Rio, Brazil (1988)

M.S., Theoretical and Applied Mechanics, Cornell University (1993)

Ph.D., Civil Engineering, Cornell University (1995)

Professor in the School of Civil and Environmental Engineering, Georgia Institute of Technology

Program Director, Mechanics of Materials, National Science Foundation

*Research Areas:*

Computational mechanics, development of methodologies to characterize deformation and fracture behavior of existing and emerging materials and structural systems, topology optimization for large-scale and multiscale/multiphysics problems, and origami

- Junuthula N. Reddy

*Current Address:*

Texas A&M University, U.S.A

*Title of Presentation:*

Ordered rate constitutive theories for non-classical thermoviscoelastic solids with dissipation and memory

*Page:*

<https://engineering.tamu.edu/mechanical/people/reddy-jn>

*Biography:*

B.E., Mechanical Engineering, Osmania University, Hyderabad, India (1968)

M.S., Mechanical Engineering, Oklahoma State University (1970)

Ph.D., Engineering Mechanics, University of Alabama in Huntsville (1973)

Oscar S Wyatt Endowed Chair Professor, Texas A&M University

Regents Professor, Texas A&M University

*Research Areas:*

In recent years, Reddy's research deals with 7- and 12-parameter shell theories, nonlocal and non-classical continuum mechanics problems, and problems involving couple stresses, surface stress effects, discrete fracture and flow, micropolar cohesive damage, and continuum plasticity of metals from considerations of non-equilibrium thermodynamics - as they appear in blood flow, bones, and materials with hard inclusions and phase

- Andrew Alleyne

*Current Address:*

University of Illinois at Urbana-Champaign, U.S.A.

*Title of Presentation:*

Power Density As The Key Enabler For Electrified Mobility

*Page:*

<https://mechanical.illinois.edu/directory/faculty/alleyne>

*Biography:*

Ph.D., Mechanical Engineering, University of California at Berkeley (1994)

M.S.E., Mechanical Engineering, University of California at Berkeley (1992)

B.S.E., Mechanical and Aerospace Engineering, Princeton University (1989)

Professor, Department of Mechanical Science and Engineering, University of Illinois at Urbana-Champaign

Associate Head for Undergraduate Programs, Mechanical Science and Engineering, University of Illinois at Urbana-Champaign

*Research Areas:*

Dynamics & Controls, Energy, Health and Bio, Manufacturing, Security and Defense, Thermo Heat and Transfer, Transportation

## **Important Dates**

Registration for attendees: July 1<sup>st</sup> – August 2<sup>nd</sup>, 2018

Paper submission for invited speakers: April 30<sup>th</sup>, 2018

Revised paper submission: July 1<sup>st</sup>, 2018

Event: August, 6<sup>th</sup> – 7<sup>th</sup>, 2018

## Manuscript Publication



<http://www.springer.com/engineering/journal/41050>

The papers submitted in the conference will be considered for publication in the inaugural issue of journal Polytechnica.

## Workshop Program

	<b>Day 1 – August 6th, 2018</b>	<b>Day 2 – August 7th, 2018</b>
9:00h	Perspectives on Manufacturing Automation under the Digital Convergence <b>Shimon Y. Nof</b>	Topology Optimization for Fluid Mechanics Problems <b>Shinji Nishiwaki</b>
10:30h	Coffee Break	Coffee Break
11:00h	Origami engineering: from deployable structures to configurational metamaterials <b>Glaucio H. Paulino</b>	Power Density As The Key Enabler For Electrified Mobility <b>Andrew Alleyne</b>
14:00h	Ordered rate constitutive theories for non-classical thermoviscoelastic solids with dissipation and memory <b>J. N. Reddy</b>	Panel Session with all Keynote Speakers on New Challenges of Engineering <b>J. F. Justo</b> (mediator)
15:30h	Coffee Break	Coffee Break
16:00h	Design, Construction and Management for Data Rich Advanced Infrastructure Systems <b>Lucio Soibelman</b>	Polytechnica Official Release <b>Emilio C. N. Silva</b> (editor)