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MULTIDISCIPLINARY ANALYSIS, INVERSE DESIGN, ROBUST OPTIMIZATION AND CONTROL (MAIDROC) LABORATORY

Department of Mechanical and Materials Engineering

Presents an Invited Lecture on

Geometrical and Mechanical Properties of Porous Metals

Matej Vesenjak, Assoc. Prof.
Faculty of Mechanical Engineering, University of Maribor, Slovenia

Date: October 31, 2014 (FRIDAY)
Time: 3:00 – 4:00 p.m.
Room: EC1115

The lecture will focus on geometrical and mechanical analysis of porous materials. It will start with an overview of the manufacturing procedures and behavior of porous materials which have an attractive combination of mechanical and thermal properties. Additionally, their application in modern engineering will be discussed. Next part of the lecture will be focusing on to the presentation of four types of porous materials (Figure): Advanced Pore Morphology (APM) foam, aluminum tube filled with closed-cell aluminum foam, Metallic Hollow Sphere Structure (MHSS) and porous structure with unidirectional pores (UniPore). Their geometrical characterization based on micro computed tomography scans and recognition of their internal porous structure will be discussed. Followed, by the presentation of the methodology for proper 2D and 3D geometrical modeling of irregular porous structures and consequent formation of computational models. The description of their mechanical behavior will be based on quasi-static and dynamic nonlinear computational simulations (ABAQUS and LS-DYNA) supported by experimental testing.

APM foam element, foam filled tube, MHSS and UniPore structure (from left to right).

Biosketch of the Invited Lecturer:
Matej Vesenjak is an Associate Professor of the Faculty of Mechanical Engineering at University of Maribor, Slovenia. He received his B.Sc. degree in Mechanical Engineering at the University of Maribor in 2001 and obtained his Ph.D. degree at the same university in 2006. From 2012 he was also a Visiting Professor at the Kumamoto University, Japan and from 2013 a Visiting professor at the Okinawa National College of Technology, Japan. His research interests focus on porous/cellular materials, mechanical properties of advanced materials, computational mechanics, crashworthiness and fluid-structure interaction. He has been awarded with numerous scholarships and fellowships and has gained professional experience at several universities and institutions worldwide. He has published more than 400 publications.
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