Università degli Studi di Pavia

Dipartimento di Meccanica Strutturale

in collaboration with

Centro di Simulazione Numerica Avanzata – CeSNA

Istituto Universitario di Studi Superiori

SEMINAR

Mechanics, Design and Application of Lattice Materials in Biomechanics

The lightest material in the world is a metallic microlattice. Its periodic microstructure is obtained by partitioning the metal into geometric equivalent cells. It is the paradigm of a lattice, almost as light as air [Fig. 1]. The hallmark of a lattice is the ultralightweight multifunctional properties, which can be tailored to be superior to any other material. There is an enormous potential to *discover by design* novel materials with a unique combination of mechanical, thermal, electric and acoustic properties.

In this seminar, I will give an overview of the research activities on lattice materials and devices carried out in the Laboratory of Multiscale Mechanics and Design Optimization of McGill University (Canada). In the first part of the talk, I will focus on the characterization of the mechanics of lattice materials as well as on certain aspects of design optimization. I will then describe three bioengineering applications, where the use of lattice materials and structures has been shown to bring remarkable benefits to the performance of the medical devices.

Fig. 1

Fig. 1. The world's lightest material resting on a dandelion fluff without damaging it. With a density of just 0.9 mg/cm3, this lattice material is around 100 times lighter than Styrofoam and lighter than the "multiwalled carbon nanotube aerogel“ [1].

Reference:

[1] T. A. Schaedler, et al., Ultralight Metallic Microlattices, Science, Vol. 334, no. 6058, pp. 962-965 (2011).

Prof. Damiano Pasini
Associate Professor, Mechanical Engineering,
McGill University, Canada

Wednesday 21 December, 10.30
MS1 Conference Room,
Department of Structural Mechanics,
Via Ferrata,1 – Pavia