



**DIPARTIMENTO DI INGEGNERIA CIVILE**  
**Dottorato di Ricerca in *Ingegneria delle Strutture e del Recupero Edilizio e Urbano***

Il giorno **31 ottobre 2016** dalle ore **14:00 alle 16:30** presso l'**Aula Multimediale** del  
Laboratorio di Strutture, i

**Prof. Vitali F. Nesterenko<sup>1</sup> - Prof. Robert E. Skelton<sup>2</sup>**

<sup>1</sup>*Department of Mechanical Engineering, University of California San Diego (USA)*

<http://maeresearch.ucsd.edu/nesterenko/>

<sup>2</sup>*Institute for Advanced Study, Texas A&M University (USA)*

<http://tias.tamu.edu/faculty-fellows/2014-15/robert-skelton>

terranno i seguenti seminari:

**Prof. Vitali F. Nesterenko (14:00-15:00):**

***Metamaterials at extreme environment***

Concept of metamaterials, assembled to achieve a properties/behavior not available in nature, was first proposed for photonics and phononics applications. In these two areas metamaterial properties were designed to manipulate small amplitude waves where response of components is linear and nondissipative.

This lecture will consider examples of metamaterials designed to provide desirable response to high amplitude impulses generated by impact, contact explosion or powerful lasers. Examples include:

1. Strongly nonlinear discrete metamaterials assembled using rigid masses connected by elements providing strongly nonlinear interaction between them. Example of this metamaterial is a granular beds composed from iron shots which can effectively mitigate contact explosion. In case of zero precompression these metamaterials are characterized as “sonic vacuum”.

2. Al-W laminates with high contrast acoustic impedances between components. Peculiar nature of nonlinear short and long duration pulses generated by high velocity impact will be analysed.

3. Design of tunable fragmentation of particulate composites. This metamaterial addresses challenges related to a few orders of magnitude discrepancy between the required size of Al particles for fast combustion and characteristic size of debris generated in high-rate dynamic fragmentation of solid and porous “natural” materials.

**Prof. Robert E. Skelton (15:30-16:30):**

***Tensegrity Assembly, Mining, and Utility Robot (TAMU-R)***

Tensegrity concepts are efficient for space structures. This talk will describe my efforts to design tensegrity robots which can build tensegrity structures in space. These structures can mine asteroids, manufacture and assemble artificial gravity spinning space habitats.

Il Coordinatore del Dottorato  
Prof. Ing. **Ciro Faella**