Università degli Studi di Pavia

Dipartimento di Meccanica Strutturale

In collaborazione con

Centro di Simulazione Numerica Avanzata – CeSNA

Istituto Universitario di Studi Superiori

SEMINAR

Multiscale FEM analysis of Nanostructured Materials Based on Equivalent Continuum Mechanics

The hierarchical multiscale modeling method considers materials that are macroscopically homogeneous, but the microstructuremay be heterogeneous (the morphology consists of distinguishable components as e.g. reinforcing phase, inclusions, grains, interfaces, and cavities). The macroscale problem is discretized using finite element method without any assumption on the material constitutive response. At every material point, where the constitutive response is needed, a microscale boundary value problem is formulated and solved, and then the overall constitutive response is determined and returned back to the macroscale problem. Using the described scheme, we study elastic properties of cortical bone considering its nanoscale microstructural constituents with various mineral volume fractions. Since the microstructure of bone consists of mineral platelet with nanometer size embedded in a protein matrix, it is similar to the microstructure of soft matrix nanocomposites reinforced with hard nanostructures. Considering a representative volume element (RVE) of the microstructure of bone as the microscale problem in the hierarchical multiscale modeling scheme, the global behavior of bone is obtained under various macroscopic loading conditions.

Prof. Reza Naghdabadi
Mechanical Engineering Department and
Institute for Nano Science and Technology
Sharif University of Technology, Tehran, Iran

Friday May 21, Aula MS1, 12.00 – 13.00
Dipartimento di Meccanica Strutturale
Via Ferrata,1 – Pavia