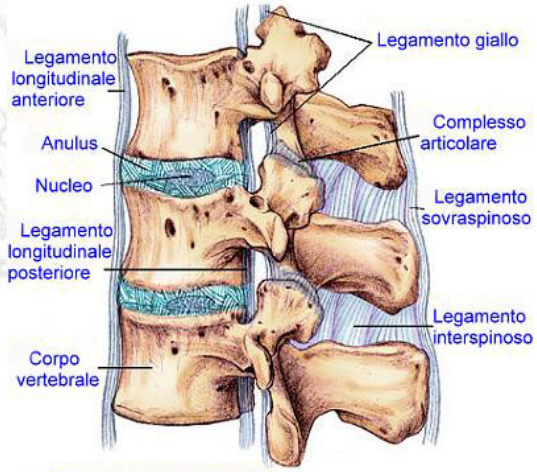
Università degli Studi di Pavia
Computational Mechanics & Advanced Materials Group - DICAr

3D@UniPV
Virtual Modeling and Additive Manufacturing for Advanced Materials

SEMINAR

Homogenization of heterogeneous beams

The study presents a two-scale model to describe out-of-plane masonry response. 1D structural elements, like columns or strips of long wall characterized by the periodic repetition of two materials arranged in stack bond, are considered. A nonlinear constitutive law is considered for one constituent of the composite, including damage and plasticity, leaving the other component to be linear elastic. A 1D beam formulation is introduced at both the structural and micromechanical scale, linking the two levels by a kinematic map. This expresses the microscopic beam strains in the masonry Unit Cell (UC) in function of the macroscopic generalized strains. A nonlinear homogenization procedure is developed, proposing a semi-analytical solution for the micromechanical problem. A force-based beam-column finite element (FE) procedure is adopted at the structural scale and the solution algorithm for the element state determination is illustrated in details. Some numerical applications, showing the UC constitutive response and the behavior of structural elements, are finally presented.



Prof. Elio Sacco
Università di Cassino

June 20th, 14:30am
DICAr – MS1
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