FACOLTÀ DI SCIENZE MATEMATICHE, FISICHE E NATURALI
DIPARTIMENTO DI MATEMATICA E FISICA "NICCOLÒ TARTAGLIA"

Effective balance equations for elastic composites subject to inhomogeneous potentials

Introduce:
Alfredo MARZOCCHI
Università Cattolica del Sacro Cuore

Interviene:
Raimondo PENTA
University of Glasgow

Abstract

We derive the new effective governing equations for linear elastic composites subject to a body force that admits a Helmholtz decomposition into inhomogeneous scalar and vector potentials. We assume that the microscale, representing the distance between the inclusions (or fibers) in the composite, and its size (the macroscale) are well separated. We decouple spatial variations and assume microscale periodicity of every field. Microscale variations of the potentials induce a locally unbounded body force. The problem is homogenizable, as the results, obtained via the asymptotic homogenization technique, read as a well-defined linear elastic model for composites subject to a regular effective body force. The latter comprises both macroscale variations of the potentials, and nonstandard contributions which are to be computed solving a well-posed elastic cell problem which is solely driven by microscale variations of the potentials. We compare our approach with an existing model for locally unbounded forces and provide a simplified formulation of the model which serves as a starting point for its numerical implementation. Our formulation is relevant to the study of active composites, such as electrosensitive and magnetosensitive elastomers.

Seminario

Martedì 11 dicembre 2018
Sala Riunioni, ore 11.00
Via dei Musei 41 - Brescia

UNIVERSITÀ CATTOLICA del Sacro Cuore