

Some mathematical issues in multiscale computational mechanics

CLAUDE LE BRIS

CERMICS, Ecole Nationale des Ponts et Chaussées, 77455 Marne-La-Valle
Cedex 2, FRANCE and INRIA Rocquencourt, MICMAC project, Domaine de
Vulceau, B.P. 105, 78153 Le Chesnay Cedex, FRANCE

lebris@cermics.enpc.fr

Abstract

The talk will overview some recent progress in the mathematical understanding of some multiscale problems in Mechanics. Under consideration are notably some homogenization problems and some questions on the passage from atomistic to continuum for some materials that have a random component.

The questions examined will be both mathematical in nature and numerical in nature. On a theoretical level, we will show some recent extensions of the theory of stochastic homogenization and will examine the relation of such problems with some questions of atomistic modelling. As regards numerical issues, we will in particular present some new numerical approaches for efficiently simulating materials with a random microstructure.

The talk is based on a series of works with A. Anantharaman (ENPC), X. Blanc (CEA and Paris 6), R. Costaour, F. Legoll (ENPC), PL. Lions (University Paris-Dauphine and Collège de France)

Referencias

- [1] A. Anantharaman, Ph D thesis, in preparation.
- [2] X. Blanc, C. Le Bris and PL. Lions, *Atomistic to Continuum limits for computational materials science*, Mathematical Modelling and Numerical Analysis (M²AN), volume 41, no 2, pp 391-426, 2007,
- [3] X. Blanc, C. Le Bris and PL. Lions, *Stochastic homogenization and random lattices*, Journal de Mathématiques Pures et Appliquées, 88, pp 34-63, 2007
- [4] R. Costaour, Ph D thesis, in preparation.