Homogenization theory and multiscale numerical approaches for random media

Claude LE BRIS, Ecole des Ponts and INRIA

We will overview a series of recent works [1, 2, 3, 4, 5, 6, 7] all related to some multiscale problems motivated by practical problems in Mechanics. The common denominator of all these works is that they address multiscale problems where the geometry of the microstructures is not periodic. Random modelling, but not only (see e.g. [2, 3]), can then be used in order to account for the imperfections of the medium. The theory at play is that of homogenization, in its many variants (stochastic, general deterministic, periodic). The numerical methods developed and adapted are finite element type methods.

A special emphasis is laid on situations where the amount of randomness is small, or, otherwise stated, when the disorder is limited (see [1] for an introductory review, and also [4] for various application fields). Then, specific, computationally efficient techniques can be designed and employed.

The works presented are joint works with various collaborators: X. Blanc (Paris 7), P.-L. Lions (Collège de France), F. Legoll, W. Minvielle (Ecole des Ponts and Inria), A. Lozinski (Besançon), and others.

Références


Claude LE BRIS, Université Paris-Est, CERMICS, Project-team Micmac, INRIA-Ecole des Ponts, 6 & 8 avenue Blaise Pascal, F-77455 Marne-la-Vallée Cedex 2
lebris@cermics.enpc.fr