Nonperiodic multiscale problems: Some recent numerical advances

Frederic Legoll*

* Ecole Nationale des Ponts et Chaussées and Inria
77455 Marne La Vallée, France
e-mail: frederic.legoll@enpc.fr

ABSTRACT

The Multiscale Finite Element Method (MsFEM) is a Finite Element type approach for multiscale problems, where the basis functions used to generate the approximation space are precomputed. They encode fine-scale details of the microstructure, and are thus specifically adapted to the problem at hand. The computation is performed in a two-stage procedure: (i) a offline stage, in which basis functions are computed as solutions to local fine scale problems, and (ii) a online stage, in which the global problem is solved using an inexpensive Galerkin approximation using a coarse mesh.

We will review some recent progresses on the approach, including: (i) the development of a more robust method, less sensitive to the geometry of the heterogeneities; (ii) the design of a posteriori error estimates, on the basis of which a strategy for adaptive discretization can be introduced.

This talk is based on joint works with L. Chamoin, C. Le Bris, A. Lozinski and F. Madiot.

REFERENCES

