ID de Contribution: **74** Type: **Non spécifié**

Homogenization of the Poisson equation in a non periodically perforated domain

jeudi 3 décembre 2020 15:00 (30 minutes)

The objective of this talk is to study the homogenization of the Poisson equation in a non periodically perforated domain (see [1]). In this setting, the size of the perforations is proportional to the distance between neighbouring cells and scales like $\varepsilon \ll 1$. More precisely, we consider the problem

$$\begin{cases} -\Delta u_\varepsilon = f \quad \text{in} \quad \Omega_\varepsilon \\ \quad u_\varepsilon = 0 \quad \text{on} \quad \partial\Omega_\varepsilon, \end{cases} \tag{1}$$

where Ω_ε is a local perturbation, at the microscopic scale, of a given periodically perforated domain. From an application point of view, Equation (1) covers more realistic situations than the pure periodic one. Inspired from [2] in the periodic case, we prove the existence of classical objects of the homogenization theory such as correctors and we show convergence of u_ε to its two scale expansion as well as convergence rates in both $W^{1,p}$, $1 < p < +\infty$ and L^∞ norms. The main difficulty of this work is that the loss of periodicity in the domain implies that the PDEs defining the correctors are posed in an unbounded perforated domain. We will explain how to overcome this point. We will also emphasize that the convergence rates obtained are optimal when we use the ad hoc non-periodic correctors.

[1] Xavier Blanc and Sylvain Wolf. Homogenization of the Poisson Equation in a non periodically perforated domain. Submitted, 2020.

[2] Jacques-Louis Lions. Asymptotic expansions in perforated media with a periodic structure. The Rocky Mountain Journal of Mathematics, 10(1):125-140, 1980.

Auteur principal: WOLF, Sylvain (Université de Paris)

Co-auteurs: Prof. BLANC, Xavier (Université de Paris, Laboratoire Jacques-Louis Lions); Prof. LE BRIS, Claude (Ecole des Ponts and INRIA)

Orateur: WOLF, Sylvain (Université de Paris)

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