Laboratoire Jacques-Louis Lions
UMR 7598 CNRS
Université Pierre et Marie Curie Paris VI
et Université Paris Diderot Paris 7
Leçons Jacques-Louis Lions 2015
24 – 27 novembre 2015

Données par **Felix Otto** (Institut Max Planck pour les mathématiques dans les sciences, Leipzig), les Leçons Jacques-Louis Lions 2015 comprendront

– un **mini cours**
A quantitative approach to stochastic homogenization
3 séances, mardi 24, mercredi 25 et jeudi 26 novembre
salle du séminaire du Laboratoire Jacques-Louis Lions
barre 15–16, 3ème étage, salle 09 (15-16-309)
Université Pierre et Marie Curie, Campus Jussieu, 4 place Jussieu, Paris 5ème
attention ! le mini cours aura lieu de 11h30 à 13h
contrairement à ce qui avait été annoncé précédemment

– et un **colloquium**
Effective behavior of random media: From an error analysis to regularity theory
vendredi 27 novembre de 14h à 15h
amphithéâtre 25 (entrée face à la tour 25, niveau dalle Jussieu)
Université Pierre et Marie Curie, Campus Jussieu, 4 place Jussieu, Paris 5ème

Abstract of the minicourse

A quantitative approach to stochastic homogenization

The minicourse is about stochastic homogenization of linear elliptic equations in divergence form. The term refers to the phenomenon that for random heterogeneous coefficients, the corresponding solution behaves on large scales like that of a deterministic homogeneous operator. This is a classical area when it comes to the qualitative theory, but not in the current research of a *quantitative* theory, which requires new concepts with respect to periodic homogenization.

A key object in all homogenization approaches is the corrector, which provides harmonic coordinates, and a key property is its sublinear growth on large scales. We shall introduce an augmented notion of corrector (scalar and vector potentials of the harmonic coordinates seen as differential forms).

On the one hand, by deterministic arguments, quantitative control of the growth properties of this augmented corrector translates into quantitative control of the homogenization error, for instance. On the other hand, by stochastic arguments, quantitative assumptions on the ergodicity of the ensemble translate optimally into quantitative control of the growth properties.

Abstract of the colloquium

Effective behavior of random media: From an error analysis to regularity theory

Heterogeneous media, like a sediment, are often naturally described in statistical terms. How to extract their effective behavior on large scales, like the permeability in Darcy's law, from the statistical specifications? A practitioner's numerical approach is to sample the medium according to these specifications and to determine the permeability in the Cartesian directions by imposing simple boundary conditions.

What is the error made in terms of the size of this *representative volume element*? Our interest in what is called *stochastic homogenization* grew out of this error analysis.

In the course of developing such an error analysis, connections with the classical regularity theory of elliptic equations and with concepts from statistical mechanics have emerged in a clearer way.

Les versions pdf de cette annonce et de l'affiche des Leçons Jacques-Louis Lions 2015 sont disponibles sur la page web

http://www.ljll.math.upmc.fr/lecons_jacques_louis_lions.html