Introduction to the Theory of Homogenization

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The main objective of this course is to give an intermidiate level introduction to the homogenization of partial differential equations (PDEs) with highly oscillatory coefficients. For simplicity, we restrict to the periodic setting. We will cover the following topics:

1. The classical qualitative homogenization in the L^2 setting.
   (a) the oscillating test function method
   (b) the div-curl lemma and the compensated compactness method
2. The uniform estiamtes due to Avellaneda and F.H. Lin.
   (a) some classical elliptic regularity theory
   (b) the three-step compactness method of Avellaneda-Lin
   (c) some impacts of the Avellaneda-Lin theory
3. The classical qualitative homogenization of Hamilton-Jacobi equation
   (a) a primer of viscosity solution theory
   (b) the method of Lions-Papanicolaou-Varadhan
   (c) the perturbed test function method

Lecture notes will be provided through updates on the website (Please check the Teaching section):

`http://ymsc.tsinghua.edu.cn/~wjing`

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