A FIRST LOOK AT HOMOGENIZATION THEORY

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In mathematics *homogenization* is a method of studying differential equations with rapidly oscillating coefficients such as

$$\nabla \cdot (A(x/\varepsilon)\nabla u) = f, \tag{1}$$

where ε is a small parameter and A is a periodic function. The study of these equations is of great importance in physics and engineering, since equations of this type govern the physics of inhomogeneous or heterogeneous materials. The goal of homogenization theory is to find the new equation, now with constant ε-independent coefficients, such that its solutions approximate the solutions of (1) as $\varepsilon \to 0$.

In this talk we treat this problem in one dimensional case (and thus, (1) reduces to an ordinary differential equation). In this case, the proofs require only several simple facts from functional analysis and Sobolev spaces theory.

This talk is a preface to the mini-course on homogenization theory, which will be held later in this semester (December 3–7).

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