

Reiterated homogenization of nonlinear monotone operators in a general deterministic setting

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Abstract. We study reiterated homogenization of a nonlinear non-periodic elliptic differential operator in a general deterministic setting as opposed to the usual stochastic setting. Our approach proceeds from an appropriate notion of convergence termed reiterated Σ -convergence. A general deterministic homogenization theorem is proved and several concrete examples are studied under various structure hypotheses ranging from the classical periodicity hypothesis to more complicated, but realistic, structure hypotheses.

1. Introduction

We study the homogenization (as $0 < \varepsilon \rightarrow 0$) of the boundary value problem

$$(1.1) \quad -\operatorname{div} a\left(\frac{x}{\varepsilon}, \frac{x}{\varepsilon^2}, Du_\varepsilon\right) = f \text{ in } \Omega, \quad u_\varepsilon \in W_0^{1,p}(\Omega; \mathbb{R})$$