

Optimal Control Problem of Oscillating PDE in a Rough Domain with Curved Interface; An Asymptotic Analysis

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Abstract

In this talk, we discuss an optimal control problem with a general elliptic PDE with oscillating coefficients in a 3-dimensional region (method applies to any n dimensional region as well) with oscillating boundary, where the base of the oscillation is curved. The aim is to do a limiting analysis (homogenization) and find the limit problem. We also include very general type of cost functional of Dirichlet type given with oscillating coefficients which can be different from the coefficient matrix of the equation. Generally such problems are hard to handle. The main ingredient is the relatively new concept of unfolding operators introduced to study homogenization problems and in this talk we present appropriate unfolding operators and approximate unfolded domain to study the limiting analysis. This is a joint work with Dr. Abu Sufian, see ESAIM: COCV 27 (2021) S4 ESAIM: Control, Optimisation and Calculus of Variations, <https://doi.org/10.1051/cocv/2020045>. We begin by giving a brief introduction to multi-scales, two-scale convergence and unfolding operators.