Homogenization of a Quasilinear Elliptic Problem in a Two-Component Domain with L^1 data

Abstract

In this presentation, we look at the homogenization of a class of quasilinear elliptic problems in a two-component domain (one connected and the other a disconnected union of small sets) with a jump of the solution on the interface, proportional to the flux. We prescribe L^1 data and coefficient periodic matrix fields $A(y,t)$ only bounded for bounded t, which implies that we cannot use the variational setting for our problem. We instead use the adapted framework of renormalized solution, where the solution is suitably defined, and does not belong to the H^1 Sobolev space but only their truncated functions are in H^1. To study the homogenization of the problem, we use the periodic unfolding method, which we can only apply to the truncated solutions, which are in H^1. Nevertheless, we are able to identify the homogenized problem, which also has only a renormalized solution. The main difficulty here is managing the boundary integral that results from the jump on the interface, and the study of the properties of the solution in the disconnected component. Conditions for the uniqueness of both problems, the oscillating one and the homogenized are also stated.