

Two-scale tools for homogenization and dimension reduction of porous thin layers and application to problems from elasticity

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In this contribution we provide tools for the homogenization and dimension reduction of thin porous layers with periodic microstructure, when the layer thickness tends to zero simultaneously with the period of the microstructure. Our multi-scale methods include extension theorems which preserve also the norm of the symmetric gradient and Korn-inequalities for functions vanishing (only) on the perforated lateral boundary of the layer. To illustrate the range of applications of the developed methods a semi-linear elastic wave equation in a thin periodically perforated layer with an inhomogeneous Neumann boundary condition on the surface of the elastic substructure is treated and a homogenized, reduced system is derived. This is a joint work with Markus Gahn and Willi Jäger, both from IWR, University of Heidelberg.