



Minisymposium 8 - Homogenisierung und Anwendungen

Homogenisation of chemical degradation mechanisms inducing the evolution of the microstructure of the porous medium

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Chemical degradation mechanisms of porous materials often induce a change of the pore geometry. A typical situation is when the reaction products take up more volume than the reactants. This effect cannot be captured by the standard periodic homogenisation method due to the local evolution of the microscopic domain. Using elements of two-scale convergence and periodic unfolding, a mathematically rigorous approach is suggested which allows the treatment of such problems. In particular, it makes use of a transformation to a stationary (periodic) reference domain on which the homogenisation can be performed. A physical interpretation also allows the direct modelling of the transformed problem. This is performed for the particular problem of concrete carbonation. It is shown that the resulting system of coupled semi-linear and quasi-linear parabolic pdes is well-posed and a-priori estimates are obtained allowing its homogenisation.