1023-35-142   **Peter A. Malte*** (`mpeter@math.uni-bremen.de`), University of Bremen, FB 3, Postfach 330 440, Bremen. *Analysis of a system of PDEs arising in the homogenisation of chemical degradation mechanisms of porous media inducing an evolution of the microstructure.*

Chemical degradation mechanisms of porous materials often result in a change of the pore geometry. Owing to the local evolution of the microscopic domain, these effects cannot be handled with the standard periodic homogenisation method. Making use of a transformation to a stationary (periodic) reference domain, a mathematically rigorous homogenisation approach is made possible, which allows for such local changes in the pore geometry. A physical interpretation of the terms in the transformed microproblem arising from the transformation also allows the direct modelling of such problems in the reference domain.

In the talk, the modelling and homogenisation of a prototypical problem is considered, in which the reaction takes place in the pore water and causes a change of volume of solid matrix (due to different densities of the reactant and the product). The corresponding microscopic problem in the reference domain consists of a coupled system of semi-linear and quasi-linear PDEs and one ODE. Particular attention is paid to the solvability of this problem and the obtaining of appropriate a-priori estimates allowing the limit passage in the homogenisation process. (Received August 21, 2006)

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