

# Numerical Upscaled Model of Transport in Multiscale Porous Media

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March 23, 2010

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## Abstract

We study numerically a new model describing the multiscale flow of a single-phase incompressible fluid and transport of a dissolved chemical by advection and diffusion through a heterogeneous porous medium without the usual assumptions of scale separation. The new model includes as special cases the classical homogenized model as well as the double porosity models, but it is characterized by the presence of additional memory terms which describe the effects of local advective transport as well as diffusion. We discuss numerical discretizations and present numerical results to show the quantitative significance of each memory term in different regimes of flow and transport.