

**Johann Radon Institute for
Computational and Applied Mathematics**
der
Österreichischen Akademie der Wissenschaften

Group Seminar

Group: Direct Field Problems

Dr. Joerg Willems

(Texas A&M University)

“An Iterative Subgrid Method for Computing Flows in Highly Porous Media”

A two-scale finite element method for solving Brinkman's equations is presented. This system of equations models fluid flows in highly porous media. Motivated by industrial applications we focus on the case of these media having a complicated internal structure represented by a heterogeneous permeability field. The method uses a recently proposed discontinuous Galerkin FEM for Stokes equations by Wang and Ye and the concept of subgrid approximation developed by Arbogast for Darcy's equations. In order to reduce boundary layer errors and to ensure convergence to the global fine solution, the algorithm is put in the framework of alternating Schwarz iterations using subdomains around the coarse-grid boundaries. Several numerical examples are presented to demonstrate the performance of this iterative procedure.

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