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Svetlana Tlupova* (stlupova@umich.edu), Department of Mathematics, 3863 East Hall, 530 Church St., Ann Arbor, MI 48109. *Numerical Solution of Coupled Stokes-Darcy Flow.*

Many important physical and biological phenomena that occur in our daily lives involve fluids partly flowing freely and partly filtrating through a porous medium. We consider a coupled problem where the free fluid flow is governed by the Stokes equations and the flow in the porous domain is governed by the Darcy equations. The model then consists of PDEs of different orders, and the coupling conditions have to be chosen carefully. We apply a non-overlapping domain decomposition method to reduce the problem size and to overcome the limitations of the direct solution. The coupled system is then reduced to solving each problem separately by an iterative procedure using a Krylov subspace method. In each subdomain, the numerical solution is based on the boundary integral formulation with preconditioners, where we apply a regularization-correction procedure for improved accuracy. (Received February 12, 2010)