

NON-MATCHING MORTAR DISCRETIZATION ANALYSIS FOR THE COUPLING STOKES-DARCY EQUATIONS*

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Abstract. We consider the coupling across an interface of fluid and porous media flows with Beavers-Joseph-Saffman transmission conditions. Under an adequate choice of Lagrange multipliers on the interface we analyze inf-sup conditions and optimal a priori error estimates associated with the continuous and discrete formulations of this Stokes-Darcy system. We allow the meshes of the two regions to be non-matching across the interface. Using mortar finite element analysis and appropriate scaled norms we show that the constants that appear on the a priori error bounds do not depend on the viscosity, permeability and ratio of mesh parameters. Numerical experiments are presented.

Key words. inf-sup condition, error estimates, mortar finite elements, multiphysics, porous media flow, incompressible fluid flow, Lagrange multipliers, saddle point problems, non-matching grids, discontinuous coefficients

AMS subject classifications. 65N30, 65N15, 65N12, 35Q30, 35Q35, 76D033, 76D07

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