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Título de la Charla:

A decoupled preconditioning technique for a mixed Stokes-Darcy model

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Resumen

Our aim is to provide an efficient iterative method to solve the mixed Stokes-Darcy model for coupling fluid and porous media flow. We consider for this model a formulation relying on an $\mathbf{H}(\mathrm{div})$-approach in the Darcy domain. The Stokes problem is expressed in the usual velocity-pressure form. The resulting weak formulation leads to a coupled, indefinite, ill-conditioned and symmetric linear system of equations. Optimal iterative methods are then important for solving efficiently these linear equations. Ideally, the algorithm should uncouple the global model in such a way that, only independent Stokes and Darcy subproblems are involved at each iterative step. We introduce here a decoupled iterative process consisting in two nested MINRES methods whose preconditioners only require the solution of several second-order H^1-elliptic problems in the Stokes and the Darcy domains. Theoretical analysis and numerical experiments show the optimality and efficiency of the proposed decoupled iterative solver.