(IP) Robust Preconditioners for Biot's Consolidation Model

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The numerical simulation of poroelastic problems [1] has become of increasing importance due to their wide range of applications. Intensive research has been focused on the design of efficient methods for solving the large linear systems arising from the discretization of Biot's model, since in real simulations it is the most consuming part. There are two typical approaches for solving such problem: fully-coupled or monolithic methods and iterative coupling methods. In the context of monolithic techniques, we aim to design efficient and robust preconditioners [2, 3] to accelerate the convergence of Krylov subspace methods. The proposed block preconditioners for solving the Biot's model are based on the well-posedness of the obtained discrete systems [4, 5], and are robust with respect to both physical and discretization parameters. This latter is a very important feature of the proposed solvers since in many physical applications the values of the parameters involved in the model vary over orders of magnitude. Numerical results are presented to support the theoretical results.

References

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