

SEMINARIO

MATHEMATICAL MECHANICS AND INVERSE PROBLEMS

EXPOSITOR

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TITLE

Finite volume discretization for flow in deformable porous media

ABSTRACT:

Many natural materials are both deformable and permeable, examples including both human tissue and subsurface rocks. It is thus of importance to have access to robust and flexible spatial discretizations for Biot's equations, which govern the coupled flow-mechanical problem.

We consider three important limits for stable discretizations of Biot's equations: Incompressible fluid, incompressible solid, and small timesteps. Robust discretizations should be able to handle any combination of these limits, however, due to the saddle-point structure of Biot's equations, this can be elusive.

As a novel result, we show that the hybridized variational finite volume framework (which includes the multi-point flux (MPFA) and multi-point stress (MPSA) approximations) allows the construction of a naturally stable cell-centered finite volume discretization for Biot's equations. We give an overview of the proof, including explicit bounds on the stability constants, and numerical examples.

Jueves 21 de Abril a las 16:00 hrs, Sala de Seminarios John Von Neumann CMM, séptimo piso.