

UNDERSTANDING DISCRETIZATION ERROR, SOLVER ERROR, AND MODEL ERROR FOR DEFORMABLE POROUS MEDIA

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Abstract

We consider topics of numerical simulation in deformable porous media. We first detail a finite volume approach to simulation, which allows for direct and guaranteed error bounds. We build on the concept of conservative methods to address the link between upscaling and solvers, both for linear and non-linear problems. This leads us to consider multilevel conservative solvers.

Our interest lies in obtaining low-cost estimates for uncertain parameters. The stochastic uncertainty provides a suitable context for quantifying the interaction between discretization and solver error.

Numerical examples illustrate the interaction between the error types, while simultaneously highlighting the challenge in obtaining robust and low-cost approximations.