On Numerical Methods For Two-Phase Flow In Porous Media

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Abstract

We first consider incompressible two-phase flow in porous media when capillary pressure is neglected. It is modeled as a nonlinear hyperbolic conservation law. In cell-centered discretization methods, calculation at the interface between two discretization cells is an essential piece of the numerical scheme. We shall review what is known about Godunov's and Upstream Mobility numerical flux and compare them. The study will include the case where the cell interface coincides with an interface between two rock types, where all the nonlinear coefficients change from one rock type to the other. Still in the two-rock type case, we introduce capillary pressure and show what needs to be changed in the case of finite volume methods or mixed finite elements.