

Uncertainty quantification for two-phase flow in porous media

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Abstract

Two-phase flow models are used to understand the extraction of oil or gas in porous media or store Carbon Dioxide in empty reservoirs. Mathematically the models consist of a system of nonlinear partial differential equations. The saturation equation is a nonlinear hyperbolic conservation law if the capillary pressure is neglected while the pressure is modeled using an elliptic equation. Some open problems in the theory will be mentioned. Many physical input variables, e.g. rock permeability, relative permeability are determined by measurement processes and hence are prone to uncertainty. Hence one needs to model uncertainty to be able to compute the effects. This is a joint work with Vitor Alves Pires at ICMC USP.