On the predictive capabilities of multiphase Darcy flow model

Matteo Icardi
Mathematics Institute
University of Warwick

Tuesday, 6th Oct, 4 p.m.
D202 Seminar room, School of Engineering, 2nd Floor

Abstract: Darcy's law is a widely used model and the limit of its validity is fairly well known. When the flow is sufficiently slow and the porosity relatively homogeneous and low, Darcy's law is the homogenized equation arising from the Stokes and Navier-Stokes equations and depends on a single effective parameter (the absolute permeability). However when the model is extended to multiphase flows, the assumptions are much more restrictive and less realistic. Therefore it is often used in conjunction with empirical models (such as relative permeability and capillary pressure curves), derived usually from phenomenological speculations and experimental data fitting.

In this work, we present the results of a Bayesian calibration of a two-phase flow model, using high-fidelity DNS numerical simulation (at the pore-scale) in a realistic porous medium. These reference results have been obtained from a Navier-Stokes solver coupled with an explicit interphase-tracking scheme. The Bayesian inversion is performed on a simplified 1D model in Matlab by using adaptive spectral method. Several data sets are generated and considered to assess the validity of this 1D model.

More info: http://www2.warwick.ac.uk/fac/sci/wcpm/seminars
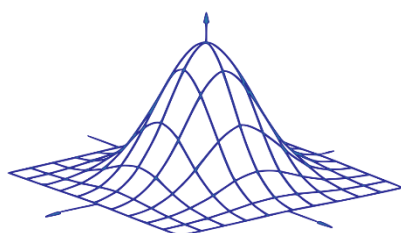
WCPM

Warwick Centre for Predictive Modelling