Texas Tech University - Department of Mathematics and Statistics
Seminar in Applied Mathematics

Fluid flows of mixed types in porous media

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Wednesday, October 21, 2015
Room: MATH 112. Time: 4:00pm.

ABSTRACT. In porous media, there are three common regimes of fluid flows: pre-Darcy, Darcy and Forchheimer. Because of their different natures, these are usually treated separately in literature. To describe complex flows when all three regimes are present, we unite them into one model. We study this model for slightly compressible fluid and derive a parabolic equation for pressure. This nonlinear partial differential equation is degenerate when the gradient is either small or large. We estimate the pressure, its gradient and time derivative in terms of initial and boundary data. Moreover, we establish the continuous dependence of the solutions on the data and other physical parameters.