Texas Tech University. Applied Mathematics Seminar.

Structural Stability of Generalized Forchheimer Flows in Porous Media

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ABSTRACT. We consider the generalized Forchheimer flows for slightly compressible fluids and study the initial boundary value problem for the resulting degenerate parabolic equation for pressure with the time-dependent flux boundary condition. We show that the solution in interior L^∞-norms and its gradient in interior $L^{2-\delta}$-norms depend continuously on the initial and boundary data, and coefficients of the Forchheimer polynomials. These results are proved for both finite time intervals and time infinity. In order to obtain this, De Giorgi's iteration is combined with the monotonicity, suitable parabolic Sobolev embeddings and a new fast geometric convergence result. This is joint work with Luan Hoang and Tuoc Phan.