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Slightly compressible fluids in heterogeneous porous media

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ABSTRACT. We study the generalized Forchheimer flows of slightly compressible fluids in heterogeneous porous media. The media's porosity and coefficients of the Forchheimer equation are functions of the spatial variables. The partial differential equation for the pressure is degenerate in its gradient and can be both singular and degenerate in the spatial variables. Suitable weighted Lebesgue norms for the pressure, its gradient and time derivative are estimated. The continuous dependence on the initial and boundary data is established for the pressure and its gradient with respect to those corresponding norms. Asymptotic estimates are derived even for unbounded boundary data as time tends to infinity. Moreover, we obtain the estimates for the L^∞-norms of the pressure and its time derivative in terms of the initial and the time-dependent boundary data. This is a joint work with Luan Hoang.