

General Forchheimer-Ward equations for compressible fluids

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ABSTRACT. We study generalized Forchheimer flows in porous media for compressible fluids including isentropic gases and slightly compressible fluids. By using J.C. Ward's dimension analysis we derive a doubly nonlinear parabolic equation for appropriately defined "pseudo-pressure". The volumetric flux boundary condition is then converted naturally to a time-dependent Robin-type boundary condition. We establish both interior and global L^∞ -estimates for the pseudo-pressure in terms of the initial and boundary data. The proofs rely upon a modification of the Moser's iteration and a version of trace theorem suitable for the considered Robin-type boundary condition. This is joint work with Luan Hoang and Thinh Kieu.