**A stability analysis for inertial two-phase flow in homogeneous porous media.**

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The general framework of this study is that of two-phase flow in porous media at a sufficiently large Reynolds number to justify the use of a model that accounts for inertial effects. More specifically, the interest is focused on the apparition of the visco-inertial instability of the 1D frontal displacement in a homogenous medium. To begin with, the case of two immiscible uncompressible fluids is considered and the generalised Darcy-Forchheimer model is used for the momentum equation. A linear stability analysis is carried out neglecting capillary effects. It is shown that the stability of the front depends in a complex fashion on both phases mobilities as well as on mobilities affected by the inertial resistance coefficients. The front can be unconditionally stable, unconditionally unstable, exhibit a stability conditioned by the flow rate relatively to a critical flow rate determined by the marginal stability.