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Double diffusive miscible viscous fingering M. MISHRA, Indian Institute of Technology Ropar, India, P.M.J. TREVELYAN, C. ALMARCHA, A. DE WIT, NLPC, Universite Libre de Bruxelles, Belgium — Miscible viscous fingering (VF) classically occurs when a less viscous fluid displaces a miscible more viscous one in a porous medium. We analyze the influence on such VF of differential diffusion between two species each of them influencing the viscosity of the fluids at hand. We show that such double diffusive effects can destabilize the classically stable situation of a more viscous fluid displacing a less viscous one. On the basis of a time-dependent linear stability analysis, all possible instability scenarios are classified in a parameter space spanned by the log-mobility ratios of each species and by the ratio of diffusion coefficients. Numerical simulations of the full nonlinear problem confirm the existence of the predicted instability scenarios and highlight the influence of differential diffusion effects on the nonlinear fingering dynamics.

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