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Buoyancy-driven instability of a miscible horizontal displacement in a Hele-Shaw cell F. HAUDIN, L.A. RIOLFO, Nonlinear Physical Chemistry Unit, Universite Libre de Bruxelles (ULB), Brussels, Belgium, B. KNAEPEN, Statistical and Plasma Physics group, Universite Libre de Bruxelles (ULB), Brussels, Belgium, A. DE WIT, Nonlinear Physical Chemistry Unit, Universite Libre de Bruxelles (ULB), Brussels, Belgium — In Hele-Shaw cells, viscous fingers are forming when a fluid is injected into a more viscous one. If the two fluids are reversed, with the less mobile fluid injected into the low viscosity one, the situation is expected to be stable from a viscous point of view. Nevertheless, a destabilization of the interface can be observed due to a buoyancy-driven effect if a density difference exists between the two miscible fluids. As a result, the Poiseuille profile established in the gap of the cell locally destabilizes and convection rolls are forming. In a view from above, a striped pattern is observed at the miscible interface between the two fluids. To characterize the development of this instability, we have performed an experimental study of viscously stable miscible displacements in a Hele-Shaw cell with radial injection. The displacing fluids are aqueous solutions of glycerol and the displaced ones are either dyed water or dyed glycerol solutions. The way the relative properties of the two fluids is influencing the onset time of the instability and the characteristic size of the pattern is studied. The influence of the gap width and of the flow rate on the buoyantly unstable dynamics is also characterized.

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