

Abstract Submitted
for the DFD08 Meeting of
The American Physical Society

Experimental study of viscous fingering of miscible circular samples displaced linearly in a Hele-Shaw cell RENAUD MAES, ANNE DE WIT, Nonlinear Physical Chemistry Unit, Université libre de Bruxelles (ULB), CP 231, 1050 Brussels, Belgium — Viscous fingering is a hydrodynamical instability occurring when a less viscous fluid displaces a more viscous one in a porous medium : their interface is unstable and develops “fingers” in the course of time. In the case of a finite width sample of fluid displaced linearly by a miscible carrying fluid of different viscosity, such a viscous fingering instability contributes to the spreading and distortion of the sample [1]. The goal of our work is to quantify experimentally the contribution of viscous fingering to the spreading of initially circular samples displaced linearly by another miscible carrying fluid using a Hele-Shaw cell as a 2D model for porous media. In a first stage, we analyze dispersion in the cell for stable interfaces using samples and displacing fluid of same viscosity, identifying a transition between a diffusive-like (dispersive) regime and a purely advective one when the injection speed is increased. We next characterize the dynamics of viscously unstable interfaces. By measuring the area and perimeter of the viscous samples as function of time, we have quantified the effects of viscous fingering on the spreading of the sample as a function of the injection speed and of the viscosity contrast between the two fluids. [1] De Wit, A., Bertho, Y., and Martin, M. Viscous fingering of miscible slices, *Phys. Fluids*, 17 (2005), 054114.

Renaud Maes
Université Libre de Bruxelles

Date submitted: 31 Jul 2008

Electronic form version 1.4