

Abstract Submitted  
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**Schlieren Imaging of Viscous-Fingering in a Horizontal Hele-Shaw Cell**<sup>1</sup> PATRICK BUNTON, GABRIELLE BROOKS, SIMONE STEWART, Department of Physics, William Jewell College, Liberty, MO USA, ANNE DE WIT, Nonlinear Physical Chemistry Unit, Université Libre de Bruxelles, Brussels, Belgium — Viscous fingering (VF) occurs when a fluid of high mobility displaces a fluid of lower mobility. Recent increased interest is motivated by applications to enhanced petroleum recover, pollutant dispersal, and climatological issues along with increased computational capability. Most often VF is observed in a Hele-Shaw (HS) cell consisting of two transparent plates separated by a narrow gap. For the typical case of transparent fluids, dyes are used for observation. Chemical indicators are used for reactive studies. Other techniques have been used such as interferometry, Schlieren, shadowgraph, fluorescence, and MRI. Here is reported a modification of Schlieren for use in imaging horizontal flows in a HS cell. The technique requires no dyes or chemical indicators that might complicate interpretation or even alter the dynamics. It is exquisitely sensitive, readily yielding information about 3D flows in gaps under a mm. Schlieren imaging is particularly useful in that it allows one to image flows within the fingers, rather than merely imaging the boundary. Following a description of the technique, data for water-glycerol systems are presented revealing previously unobserved internal detail. This detail is interpreted in terms of recently published 3D models of VF.

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