

Meeting: 1001, Evanston, Illinois, SS 11A, Special Session on Stability Issues in Fluid Dynamics

1001-76-293 **Harry L. Swinney*** (swinney@chaos.utexas.edu), University of Texas, Department of Physics, Austin, TX 78712, and **O. Praud** and **E. Sharon**. *Fractal patterns formed by growth of radial viscous fingers.*

We examine fractal patterns formed by the injection of air into oil contained in a thin (0.13 mm) layer contained between two cylindrical glass plates of 288 mm diameter (a Hele-Shaw cell). The resultant radially grown patterns are similar to those formed in Diffusion Limited Aggregation (DLA), but the relation between the continuum limit of DLA and continuum (Laplacian) growth remains an open question. Our viscous fingering patterns approach an asymptotic state with a generalized dimension $D_q = 1.70 \pm 0.02$ that is independent of q ; that is, the patterns are self-similar. This D_q agrees well with recent calculations for DLA clusters. We find that the probability distribution of unscreened angles measured at late times approaches a form that is independent of forcing strength and cluster size, which suggests that this distribution function is an invariant property of the growth process. (Received August 30, 2004)