Abstract Submitted
for the MAR05 Meeting of
The American Physical Society

Selective Withdrawal with an Inverted Viscosity Ratio SARAH CASE, SIDNEY NAGEL, The University of Chicago — In the selective withdrawal experiment, fluid is withdrawn, at rate Q, through a tube with its tip suspended a distance S above an unperturbed interface separating two immiscible fluids. For high Q, the lower fluid is entrained along with the upper one while for low Q only the upper fluid is withdrawn. We have studied the situation where the ratio of lower to the upper fluid viscosities, $\eta > 1$. For low Q, the interface forms a steady-state hump and only the upper fluid is withdrawn. When Q is increased, or S is decreased, the interface undergoes a two-stage transition: first the hump forms an unsteady, thin spout which then expands into a second thicker steady-state structure with distinct flow patterns in the lower fluid. This thick-spout structure is not observed for $\eta < 1$. Near the hump to thin-spout transition, the hump curvature increases with power-law scaling similar to that seen for $\eta < 1$. [1] If Q is decreased from the thick spout regime, a steady-state thin spout can also be created within a limited hysteretic region. [1] I. Cohen and S. R. Nagel, Phys. Rev. Lett. 88, 074501 1- 4 (2002).

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Date submitted: 29 Nov 2004 Electronic form version 1.4