

Abstract Submitted
for the DFD06 Meeting of
The American Physical Society

Large-amplitude wave evolution in two-layer pressure-driven flow
PRASHANT VALLURI, PETER SPELT, CHRIS LAWRENCE, GEOFF HEWITT,
Imperial College London — Large-amplitude wave evolution is investigated numerically for two-layer pressure-driven flow, with possible applications in slug initiation. The flow is laminar, 2D and involves two fluids that are of different density and viscosity. The numerical (level-set) method is verified by comparison with the Orr-Sommerfeld-type analysis for this flow, at small amplitudes. The wave growth in the linear regime is shown to be caused by the viscosity contrast. It is shown that waves of relatively large wave length trigger shorter waves (approximately corresponding to the most dangerous mode). Coalescence of the short waves eventually lead to a relatively long wave of very large amplitude. These findings are discussed in the context of previous experimental observations of slug initiation.

Peter Spelt
Imperial College London

Date submitted: 05 Aug 2006

Electronic form version 1.4