1077-35-1037   **Michael Shearer*** (`shearer@ncsu.edu`), Department of Mathematics, NC State University, Raleigh, NC 27695, and **Kim Spayd** and **Zhengzheng Hu**. *Two Phase Flow in Porous Media: the Saffman-Taylor Instability Revisited.*

Plane waves for two phase flow in a porous medium are modeled by the one-dimensional Buckley-Leverett equation, a scalar conservation law. We analyze linearized stability of sharp planar interfaces to two-dimensional perturbations, which involves a system of PDE. Numerical simulations of the full nonlinear system, including dissipation, illustrate the analytical results. We also discuss a modified Buckley-Leverett equation, in which the capillary pressure is rate-dependent, thereby adding a BBM-type dispersive term. This equation sustains undercompressive planar waves, but they are all unstable to two-dimensional perturbations. (Received September 15, 2011)