1056-76-472 **Ellen Peterson*** (erpeters@ncsu.edu), North Carolina State University, Box 8205, Raleigh, NC 27695, and **Michael Shearer** (shearer@ncsu.edu), North Carolina State University, Box 8205, Raleigh, NC 27695. *Spreading Surfactant on a Thin Liquid Layer.*

To model the spreading of a rotationally symmetric droplet of insoluble surfactant on a thin liquid layer, we use the lubrication approximation of the Stokes equations. The resulting system of nonlinear PDE describes the height of the fluid surface and the distribution of surfactant on the surface. The flow is driven by the surface tension gradient induced by the surfactant. Ignoring the smoothing effects of capillarity and diffusion of surfactant, the system simplifies to a pair of transport equations that have hyperbolic/parabolic type. These equations admit a similarity solution characterized by Jensen and Grotberg (1992) that sets the spreading rate of the surfactant layer. We employ finite difference simulations to capture the shape of the free surface and the surfactant distribution. For the full system, with capillarity, the smoothing effect of gravity, and diffusion on the surface, the leading shock smooths to a ridge clearly visible in experiments. We compare simulations of the full thin film system with experimental observations of film height profiles, and with the observed spreading rate of the surfactant layer, visualized using fluorescence. (Received September 09, 2009)