Meeting: 998, Houston, Texas, SS 8A, Special Session on Dynamical Systems

998-37-227 **James C. Alexander*** (jca10@case.edu), Department of Mathematics, Case Western Reserve University, 10900 Euclid Avenue, Cleveland, OH 44106, **Andrew Bernoff** (ajb@hmc.edu), Department of Mathematics, Harvey Mudd College, 1250 N. Dartmouth Avenue, Claremont, CA 91711, **Elizabeth Mann** (mann@physics.kent.edu), Department of Physics, Kent State University, Kent, OH 44242, and **J. Adin Mann**, Department of Chemical Engineering, Case Western Reserve University, 10900 Euclid Avenue, Cleveland, OH 44106. *Domain Relaxation in Polymer Monolayers.* Preliminary report.

I will report on both experimental and theoretical studies of a polymer monolayer (with a typical width of a 100 microns) on the surface of a quiescent subfluid. When stretched (by a transient applied stagnation point flow), these domains take the form of a "bola" or dumb-bell, consisting of two roughly circular reservoirs connected by a thin tether. This shape will then relax very slowly to the minimum energy configuration of a circular domain. The tether is never observed to rupture, even when the tether is more than a hundred times as long as it is thin. We model these experiments by taking previous descriptions of the full hydrodynamics (by McConnell & Stone, Lubensky & Goldstein, etc.), identifying the dominant effects via dimensional analysis, and reducing the system to a more tractable form. We derive relaxation rates for perturbations of a uniform strip and a circular patch. Lubrication theory for the evolution of the tether yields the thin film equation $h_t = (h^n h_{xxx})_x$ with $n = 2$. We show that this evolution equation appears not to manifest rupture, in agreement with the experiments. Finally, we speculate on which physical properties of the system (such as line tension) can be deduced by comparison of the theory to the experiment. (Received February 27, 2004)