Abstract Submitted
for the DFD07 Meeting of
The American Physical Society

Coalescence and breakup between a capillary switch and a droplet
A. HIRSA, I. MARTINOVIC, Rensselaer Polytechnic Institute, C. LOPEZ, Universidad Politecnica de Madrid, O. BASARAN, S. RAMALINGAM, Purdue University
— A capillary switch can be formed by overfilling a circular orifice in a plate with liquid, where the contact line is pinned at the rim by using a non-wetting substrate. For surface tension to be the dominant force in the system, the size of the hole has to be smaller than the capillary length (about a millimeter for water). Application of capillary switches has already been demonstrated in optics through a fast-acting adaptive lens. Here, we investigate how capillary switches can be used to detach a small packet of liquid from a substrate and subsequently reattach it elsewhere without the use of any moving parts. Overcoming the inherent adhesion force between the liquid packet and its substrate is the challenge. Experiments have been conducted on the coalescence and subsequent breakup of a switch and a droplet (pendant or sessile) which encapsulates the liquid packet. The coalescence and break-up processes are also analyzed computationally using finite element analysis and the predictions are compared with the experimental measurements.

Amir Hirsa
Rensselaer Polytechnic Institute

Date submitted: 03 Aug 2007 Electronic form version 1.4