1036-76-58 **Shawn W. Walker*** (walker@cims.nyu.edu), 251 Mercer Street, New York, NY 10003, and **Ricardo H. Nochetto** and **Andrea Bonito**. *Modeling and Simulating the Fluid Dynamics of Electrowetting On Dielectric (EWOD) with Contact Line Friction.*

Electrowetting On Dielectric (EWOD) refers to a parallel-plate device that moves fluid droplets through electrically actuated surface tension effects. These devices have potential applications in biomedical 'Lab-On-A-Chip' devices (automated DNA testing, cell separation) and controlled micro-fluidic transport (e.g. mixing and concentration control). The fluid dynamics are modeled using Hele-Shaw type equations (in 2-D) with a focus on including the relevant boundary phenomena. Specifically, we model contact line pinning as a static (Coulombic) friction effect and effectively becomes an inequality constraint for the motion of the liquid-gas interface that accounts for the 'sticking' effect of the interface. The model is presented in a variational framework and is discretized using Finite Elements. The curvature/surface tension is discretized in a semi-implicit way for accuracy using an explicit representation of the interface. Simulations are presented and compared to experimental videos of EWOD driven droplets. These experiments exhibit droplet pinching and merging events and are reasonably captured by our simulations. (Received January 03, 2008)