

Abstract Submitted  
for the DFD14 Meeting of  
The American Physical Society

**Buckling instability of thin films as a means to control or enhance fluid flow within microchannel** BEHROUZ TAVAKOL, ASCHVIN CHAWAN, Virginia Tech, DOUGLAS HOLMES, Boston University — Here we show that the buckling of thin, flexible plates can be used for pumping fluids, controlling the flow rate, and mixing different media within a microfluidic channel. A confined, dielectric elastomeric film buckles out of the plane when exposed to an electric field. We use an electrolytic fluid solution as the electrode to enable buckling at relatively low voltages, and to enhance the rate of deformation. When embedded in a microfluidic channel, this mechanism can be used as a microvalve that controls the flow rate, or as a micropump that alters the flow rate. A similar mechanism can be used to aid diffusion between two adjacent laminar streams and improve mixing. This novel means for dielectric actuation may improve voltage application, and the buckling microstructures may be used in variety of applications to accurately control and manipulate fluid flow in a microchannel.

Behrouz Tavakol  
Virginia Tech

Date submitted: 01 Aug 2014

Electronic form version 1.4