Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

Soft, Hydrodynamically Coupled Particles in a Hele-Shaw Channel[1] WILLIAM USPAL, Physics, Massachusetts Institute of Technology, PATRICK DOYLE, Chemical Engineering, Massachusetts Institute of Technology
— Control of flowing suspensions is central to many emerging microfluidic applications. For instance, manipulation of small clusters is important in the synthesis of functional particles. Via theory and simulations, we study small clusters confined in a microchannel with thin cross section and subject to an external flow. We show that many-body hydrodynamic interactions sustain long-lived bound states with complex dynamics. As these interactions are sensitive to confinement, we investigate modulation of channel geometry as a means to perform sequential operations in a continuous process. We also probe the effects of shape and elasticity via a Lattice Boltzmann/Lattice Spring code, finding spontaneous excitation of elastic waves ("flapping"), and enriched behavior through the orientational effects of shape. Our results demonstrate phenomena that could be exploited for assembly of soft colloids in microchannels.

[1]Supported by the Institute for Collaborative Biotechnologies through grant W911NF-09-0001 from the U.S. Army Research Office.

William Uspal
Dept. of Physics, Massachusetts Institute of Technology

Date submitted: 29 Nov 2011 Electronic form version 1.4