Abstract Submitted
for the DFD09 Meeting of
The American Physical Society

Jamming in Microfluidic Channels CARLOS ORTIZ, KAREN DANIELS, ROBERT RIEHN, North Carolina State University — We experimentally investigate the flow of a colloid through a microfluidic device. The glass microfluidic device consists of a wide channel with spatially periodic funnels manufactured with photolithographic methods. The device was etched to a depth of about 1 micron that restricts the solid phase of the colloid, fluorescent polystyrene spheres with sub-micron radii, to quasi-2D motion. The liquid phase of the colloid is an aqueous solution with trace amounts of a non-ionic surfactant and with a pH about 2 units above the pKa of the surface groups on the polystyrene spheres to maintain a stable colloid at concentrations high enough to produce jamming. The flow rate of the colloid is controlled by a computer interfaced syringe pump with two controllable modes of operation: a continuous, steady mode that provides a plug-like velocity profile and a discrete, jerky mode that sends compressional waves of specifiable sizes through the colloid. Using fluorescence microscopy, we observe the interactions between the colloid and the glass funnels and investigate how the interaction depends on the funnel geometry. In particular, we investigate the jamming transition from a liquid-like flowing state to a solid-like stationary state.

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Date submitted: 10 Aug 2009 Electronic form version 1.4