Abstract Submitted
for the DFD11 Meeting of
The American Physical Society

Confinement Effects in Oscillating Nanoscale Flows CHARLES LISSANDRELLO, VICTOR YAKHOT, KAMIL L. EKINCI, Department of Mechanical Engineering, Boston University — We present an experimental study of confinement in oscillating nanoscale flows. In the experiment, we measure the resonant parameters of a microcantilever with a sphere attached at the tip. As the sphere is brought towards a flat plate in a dry nitrogen environment, the flow becomes confined in the gap between the sphere and the plate, affecting the resonant frequency and dissipation of the cantilever. We tune the gap, the nitrogen pressure, and the oscillation frequency in order to study the flow over a broad range of dimensionless parameters. We observe deviations from continuum fluid dynamics at small gaps, low pressures, and high frequencies. Using these measurements, we provide an in-depth characterization of confinement effects in oscillating nanoflows.

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Date submitted: 05 Aug 2011 Electronic form version 1.4