Abstract Submitted
for the DFD12 Meeting of
The American Physical Society

Inertial particle trapping and transport in viscous streaming KWITAE CHONG, JEFF D. ELDREDGE, University of California, Los Angeles — A probe undergoing rectilinear oscillation creates a steady large-scale circulatory flow, which is conventionally called viscous streaming. This streaming flow, generated by the nonlinear interaction of the primary oscillatory motion, can provide an appealing option in micromanipulation, such as trapping, positioning and transport of a discrete particle. In this study, the streaming flow around a circular cylinder is obtained from previous analytical solution (by asymptotic expansion in small amplitude). The motion of an inertial particle in this flow is obtained by integrating the Maxey-Riley equation, in which the wall effect is newly considered. It has been observed in our previous work that, under certain conditions, the inertial particle is trapped inside the center of a streaming cell near the probe; here, the manner of trapping is re-explored under various choices of physical parameters, such as Reynolds number, particle size and density. We also extend the study to various arrangements of multiple oscillating probes by using high-fidelity computations to simulate particle transport between probes. In particular, we demonstrate systematic particle transport between probes by selectively stopping and starting the oscillatory motion of adjacent probes.

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Date submitted: 03 Aug 2012 Electronic form version 1.4