Abstract Submitted
for the DFD09 Meeting of
The American Physical Society

Particle Focusing and Dispersion in Suspension Flow through a Corrugated Tube GREGORY HEWITT, JEFFREY MARSHALL, University of Vermont — A computational study is performed of the transport of a particulate suspension through a corrugated tube using a discrete-element method. The tube is axisymmetric with a radius that varies sinusoidally, which in the presence of a mean suspension flow leads to periodic inward and outward acceleration of the advected particles. The oscillations in radial acceleration and straining rate lead to a net radial drift, with mean acceleration measuring an order of magnitude smaller than the instantaneous radial acceleration, which over time focuses small particles within the tube. The foundations of particle focusing in this flow are examined analytically using lubrication theory together with a low Stokes-number approximation for the particle drift. Computations are then performed using a finite-volume method for fluid flow in the tube at higher Reynolds numbers over a range of amplitudes, wavelengths and Reynolds numbers, examining the effect of each of these variables on the averaged radial fluid acceleration. A discrete-element method (DEM) is used to simulate particle behavior at finite Stokes numbers.

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Date submitted: 04 Aug 2009 Electronic form version 1.4