Abstract Submitted
for the DFD06 Meeting of
The American Physical Society

Three dimensional numerical simulation of a suspension of multiple deformable liquid capsules in pressure-driven flow SAI DODDI, PROSENJIT BAGCHI, Rutgers University — Capsules are liquid drops surrounded by hyper-elastic membranes, and are representative of biological cells. We present 3D numerical simulations of a large ensemble of capsules (up to 350 in numbers) flowing through a rectangular channel at low Reynolds numbers. The numerical method is based on the front tracking method, and the capsule membranes are assumed to follow neo-Hookean law. First we will discuss the lateral migration of an isolated capsule in the channel. The numerical results will be compared with the analytical results in the limit of small deformation. Then we will present results on how the lateral migration is affected in presence of a pairwise interaction between two neighboring capsules. We will show that the deformation-induced lateral migration is strongly hindered by the dispersion effect of the pairwise interaction. Finally, we will present simulations of the flow of suspension of multiple capsules up to 350 in numbers. The focus here will be on the multi-particle interaction, formation of the particle-free region near the wall, and the microstructure evolution.

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Date submitted: 04 Aug 2006 Electronic form version 1.4