Abstract Submitted
for the DFD12 Meeting of
The American Physical Society

Numerical study of the boundary conditions in particulate suspensions with the lattice Boltzmann method LINA XU, LAURA SCHAEFER, University of Pittsburgh — Particulate suspensions are common phenomena in industrial and biological fields. However, the fundamental understanding of the hydrodynamic interactions between the solid and fluid needs to be further improved. The lattice Boltzmann method has been shown to be an effective numerical method to model various fluid flows, and exhibits good performance in dealing with boundary conditions, with straightforward and easy-to-implement methods for complex solid boundaries. In this presentation, the units transfer between the lattice Boltzmann system and the physical system is characterized in detail, in order to simulate flows from the realistic physical world. Force evaluations, based on the momentum exchange method and the FH model used to implement boundary conditions, are shown for both a static and moving cylinder in a 2D channel. Finally, the settling trajectory of the cylinder after it is released away from the centerline in a Poiseuille flow is investigated with varying Reynolds numbers.

Lina Xu
University of Pittsburgh

Date submitted: 03 Aug 2012 Electronic form version 1.4