Abstract Submitted
for the DFD13 Meeting of
The American Physical Society

A New Moving Boundary Condition 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. However, most of the previous boundary conditions used for the moving complex surface are based on the half way bounce-back boundary condition, where the geometric integrity of the body cannot be kept. In this presentation, a new boundary condition based on the Chapman-Enskog expansion is proposed for the moving complex surface, where the precise shape of the body can be preserved during the calculation. Moreover, due to the second order accuracy of the Chapman-Enskog expansion when recovering the Navier-stokes equation from the Boltzmann-BGK equation, the new boundary condition can maintain the same accuracy for the whole computational domain.

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Date submitted: 02 Aug 2013 Electronic form version 1.4