Abstract Submitted
for the DFD07 Meeting of
The American Physical Society

Direct simulations of spherical particle suspensions in a sliding tri-perioidic cell[1] WOOK RYOL HWANG, School of Mechanical and Aerospace Engineering, Gyeongsang National University, MARTIEN A. HULSEN, Materials Technology, Eindhoven University of Technology, TAI HUN KWON, Department of Mechanical Engineering, POSTECH, HAN E.H. MEIJER, Materials Technology, Eindhoven University of Technology — We present a finite-element/fictitious-domain scheme for 3D direct simulations of suspensions of spherical particles in a Newtonian fluid in simple shear flow in a tri-periodic computational domain, which is a 3D extension of the authors' previous 2-D work [J. Comput. Phys. 194 (2004) 742]. The sliding tri-periodic cell, where suspensions in an unbounded domain in simple shear may be treated by a representative particulate problem in a unit cell, has been implemented with the mortar element method. The force-free torque-free rigid body motion of ta spherical particle is described by the rigid-shell description and implemented by Lagrangian multipliers only on the particle boundary. The bulk stress is obtained by simple boundary integrals. Through the several example problems, we discuss the the rheological properties of the bulk shear viscosity and the first/second normal stress coefficients.

[1]This work was supported by the Korea Research Foundation Grant (KRF-2007-331-D00134)

Wook Ryol Hwang
School of Mechanical and Aerospace Engineering,
Gyeongsang National University

Date submitted: 07 Aug 2007 Electronic form version 1.4