Abstract Submitted
for the DFD06 Meeting of
The American Physical Society

Multiparticle Simulations of Deformable Red Blood Cells using Lattice-Boltzmann Method ROBERT MACMECCAN, JONATHAN CLAUSEN, SHEILA REZAK, G. PAUL NEITZEL, CYRUS AIDUN — The rheology of blood flow is largely dependent on red blood cell (RBC) membrane deformation. Furthermore, simulating blood at physiologic hematocrit requires inclusion of RBC deformation. A new method is developed by coupling the finite-element method for RBC's to the lattice-Boltzmann method for fluid flow. An elastic finite element model provides easy incorporation into the lattice-Boltzmann framework and enough computational efficiency to simulate suspensions at high volume fractions. Red blood cell deformation and surface stress distribution are discussed for three dimensional multiparticle simulations in wall-bounded shear flow. Due to the versatility of finite-element in describing the geometry and deformation of solid particles, this method may be applied to any suspensions of deformable and rigid particles.

Cyrus Aidun
Georgia Institute of Technology

Date submitted: 04 Aug 2006 Electronic form version 1.4