Abstract Submitted
for the DFD05 Meeting of
The American Physical Society

Numerical evaluation of stress contribution by model red blood cells in shear flow JEFFREY MORRIS, City College of New York, JON CLAUSEN, CYRUS AIDUN, Georgia Institute of Technology, JOHN MCLAUGHLIN, Clarkson University — Contributions to the stress of a dilute suspension of biconcave disks in simple shear flow are reported. The disks are a geometric but nondeformable model of red blood cells (RBCs), with biconcave disk geometry. Motion of disks and an equal density suspending liquid is computed using a lattice-Boltzmann equation technique. The disks, unless oriented with the normal to their "flat" side oriented along the vorticity direction of the shear flow, are found to tumble in a motion which becomes periodic after an initial transient. The stress contribution of the RBCs thus undergoes a periodic variation, and we report results of the instantaneous and averaged stress contributions of these particles in the dilute limit where computations of a single body motion suffice. The symmetric first moment of the surface force distribution, or stresslet is the primary contribution at low Reynolds number, and its shear and normal stress components are determined. The role of weak inertia, requiring integration over the volume of the fluid to capture the Reynolds stress contribution resulting from velocity fluctuations induced by the model RBC, will be discussed.

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Date submitted: 15 Aug 2005

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