Abstract Submitted
for the DFD10 Meeting of
The American Physical Society

**A Comparison of Multi-scale and Low-Dimensional Models of Red Blood Cells**[1] WENXIAO PAN, Pacific Northwest National Lab, DMITRY FEDOSOV, Forschungszentrum Juelich, BRUCE CASWELL, GEORGE KARNIADAKIS, Brown University — A new low-dimensional dissipative particle dynamics (DPD) model of the red blood cell (LD-RBC) is tested against a multi-scale RBC (MS-RBC) model known to accurately capture the mechanical response of single human RBCs in a number of static and dynamic experiments. The MS-RBC model represents the RBC membrane with hundreds or even thousands of DPD-particles and includes membrane viscosity. In contrast, the LD-RBC is constructed as a closed torus-like ring of only 10 large, hard DPD-particles previously employed to represent a colloidal suspension. Except for channel sizes comparable to RBC diameters, suspensions of LD-RBCs also capture the essential hydrodynamics of blood flow in vessels as faithfully as do suspensions of MS-RBCs. In particular, the LD-RBC is in agreement with the experimental data for the apparent viscosity of blood and its cell-free layer over a wide range of hematocrits.

[1]Supported by NIH R01HL094270.

George Karniadakis
Brown University

Date submitted: 03 Aug 2010 Electronic form version 1.4