Abstract Submitted
for the DFD13 Meeting of
The American Physical Society

Thermal Fluctuations in Smooth Dissipative Particle Dynamics simulation of mesoscopic thermal systems NIKOLAOS GATSONIS, JUN YANG, Worcester Polytechnic Institute — The SDPD-DV is implemented in our work for arbitrary 3D wall bounded geometries. The particle position and momentum equations are integrated with a velocity-Verlet algorithm and the entropy equation is integrated with a Runge-Kutta algorithm. Simulations of nitrogen gas are performed to evaluate the effects of timestep and particle scale on temperature, self-diffusion coefficient and shear viscosity. The hydrodynamic fluctuations in temperature, density, pressure and velocity from the SDPD-DV simulations are evaluated and compared with theoretical predictions. Steady planar thermal Couette flows are simulated and compared with analytical solutions. Simulations cover the hydrodynamic and mesocopic regime and show thermal fluctuations and their dependence on particle size.

Jun Yang
Worcester Polytechnic Institute

Date submitted: 31 Jul 2013 Electronic form version 1.4