Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Channeling and stress for fluid and suspension flows in self-affine fractures[1] TAK S. LO, JOEL KOPLIK, Levich Institute, City College of CUNY — The flow of fluids and particulate suspensions in realistic models of geological fractures is investigated using lattice Boltzmann simulations. The bounding walls are self-affine fractal surfaces and combined to form a tight fracture, i.e. one in which where the particle size, the mean aperture and the surface roughness are all comparable. We consider pressure-driven flow of a viscous Newtonian liquid and model the particles as rigid non-colloidal solid spheres. Our focus is the channeling phenomena, where we compare the preferred paths for fluid flow and the suspended particles to the fracture aperture. The preferred paths are found to be somewhat similar for pure fluid and particulates, and not immediately related to the fracture aperture map. We further investigate the stress exerted on the fracture walls during flows in the irregular channel, which is useful in geological applications. Finally, we examine the spatial correlations in the stress and velocity distributions and compare to the statistics of the aperture field and identify the relationship between them.

[1]Work supported by DOE and NERSC

Tak Lo
Levich Institute, City College of CUNY

Date submitted: 15 Nov 2013 Electronic form version 1.4