Abstract Submitted
for the DFD07 Meeting of
The American Physical Society

Comparing two methods of simulating mirco-scale viscous flows in a porous channel[1] HUI GAO, JIE HAN, YAN JIN, LIAN-PING WANG, University of Delaware — Water flows in natural soil porous media are important to colloid-facilitated transport of contaminants and other phenomena with groundwater as the carrier. The 3D micro-scale flow is complicated due to the complex geometry. The transport and deposition of colloids in such flows are affected by several physical and chemical forces involved. In this talk, we first compare two methods of simulating viscous flows in both 2D and 3D channels filled with glass-bead particles. The first method is Physalis developed by Prosperetti's group, at Johns Hopkins, based on solving the Navier-Stokes equation using a combination of numerical solution and local analytical Stokes flow representation. The second method is a meso-scale approach by solving a lattice Boltzmann equation. Specific implementation issues will be discussed. The two methods yield almost identical flows. Preliminary simulation results as well as parallel experimental results on colloid deposition in the porous channel will also be presented.

[1]Supported by USDA

Lian-Ping Wang
University of Delaware

Date submitted: 08 Aug 2007 Electronic form version 1.4