Abstract Submitted
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Micro-scale flow simulation and colloid transport modeling in saturated porous media[1] QUEMING QIU, YAN JIN, LIAN-PING WANG, University of Delaware — Adequate understanding of the mechanisms governing colloid retention by soil porous media is essential to the prediction and monitoring of the transport of contaminants through groundwater in the subsurface environment. This talk focuses on the representation of micro-scale flow and colloid-grain surface interactions in a computational approach with 3D porous media packed with glass beads. A corresponding 2D porous media is also developed to save some computational efforts. After solving the flow field with the Lattice Boltzmann method, a Lagrangian colloid tracking model is used to study the dynamics of colloidal particles considering Brownian force, hydrodynamic forces, and physicochemical forces. The attachment efficiency at favorable condition in our 3D model is compared with experimental data and also the efficiency predicted from other research group with different models. Under the unfavorable condition, the modeling and analysis of colloid transport will explore the effects of solution ionic strength on colloid reversible retention in both 2D and 3D models. To speed up our colloid tracking modeling, parallel implementation using Message Passing Interface (MPI) is performed and the related complexity analysis and scalability results will also be presented.

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