Coupling LAMMPS with Lattice Boltzmann fluid solver: theory, implementation, and applications.[1] JIFU TAN, TALID SINNO, SCOTT DIAMOND, University of Pennsylvania — Studying of fluid flow coupled with solid has many applications in biological and engineering problems, e.g., blood cell transport, particulate flow, drug delivery. We present a partitioned approach to solve the coupled Multiphysics problem. The fluid motion is solved by the Lattice Boltzmann method, while the solid displacement and deformation is simulated by Large-scale Atomic/Molecular Massively Parallel Simulator (LAMMPS). The coupling is achieved through the immersed boundary method so that the expensive remeshing step is eliminated. The code can model both rigid and deformable solids. The code also shows very good scaling results. It was validated with classic problems such as migration of rigid particles, ellipsoid particle's orbit in shear flow. Examples of the applications in blood flow, drug delivery, platelet adhesion and rupture are also given in the paper.

[1]NIH

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