

A Parallel Fluid Solid Coupling Tool using Lammmps and Palabos

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Fluid flow coupled with solid particles 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 was solved by PALABOS (parallel Lattice Boltzmann solver), while the solid displacement and deformation was simulated by LAMMPS (Large-scale Atomic/Molecular Massively Parallel Simulator). The coupling was achieved through the immersed boundary method. The code can model both rigid and deformable solids. The code also showed very good scaling results. It was validated with classic problems such as ellipsoid particle's orbit in shear flow. Examples of the applications were given in blood flow, drug delivery, platelet adhesion and interaction with neutrophils in microfluidics.

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