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Three-dimensional collision of general-shaped particles in a viscous fluid MOHSEN DAGHOOGHI, IMAN BORAZJANI, State Univ of NY - Buffalo — The hydrodynamic interactions between rigid particles in a viscous fluid in semi-dilute and dense suspensions require a collision strategy to detect and prevent near collision and overlapping between particles in numerical simulations. While various collision models have been developed for spherical particles, very limited models are currently available for complex-shaped particles. In earlier methods, a repulsive force is applied to the particles when their distance is less than a threshold value and, depending on the magnitude of this repulsive force, collision may not be prevented or particles may bounce unrealistically. We have developed a three-dimensional numerical technique for general-shaped particles that: (1) detects near collision of complex-shaped objects in contrast to straightforward detection of spherical particles; and (2) guaranties overlap prevention. Contrary to conventional methods, we used an iterative method to exert a sufficient force and/or moment on each particle to prevent particles from overlapping without causing them to bounce back as expected at low Stokes numbers.

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