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Distributed-Lagrange-Multiplier-based computational method for particulate flow with collisions AREZOO ARDEKANI, ROGER RANGEL, University of California, Irvine — A Distributed-Lagrange-Multiplier-based computational method is developed for colliding particles in a solid-fluid system. A numerical simulation is conducted in two dimensions using the finite volume method. The entire domain is treated as a fluid but the fluid in the particle domains satisfies a rigidity constraint. We present an efficient method for predicting the collision between particles. In earlier methods, a repulsive force was applied to the particles when their distance was less than a critical value. In this method, an impulsive force is computed. During the frictionless collision process between two particles, linear momentum is conserved while the tangential forces are zero. Thus, instead of satisfying a condition of rigid body motion for each particle separately, as done when particles are not in contact, both particles are rigidified together along their line of centers. Particles separate from each other when the impulsive force is less than zero and after this time, a rigidity constraint is satisfied for each particle separately. Grid independency is implemented to ensure the accuracy of the numerical simulation. A comparison between this method and previous collision strategies is presented and discussed.

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