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Modeling Visco-elastic Particle Collision in Coupled Direct Numerical/Discrete Particle Simulations JULIAN SIMEONOV, JOSEPH CALANTONI, Marine Geosciences Division, Naval Research Laboratory, Code 7440.3, Stennis Space Center, MS 39529, USA — We study particle collision with coupled Direct Numerical Simulations (DNS) and Discrete Particle Simulations (DPS) where the flow and the particle evolution are determined from the Navier-Stokes and Newton's equations of motion, respectively. The hydrodynamic force on a particle is obtained by integrating the resolved pressure and viscous stress on the particle surface, and the normal and tangential particle- contact forces are modeled with springs and friction. Resolving visco-elastic collisions in DNS/DPS requires integrating the fluid equations at time steps of a few microseconds that are prohibitively small for modeling large turbulent systems. We develop a robust collision scheme for coupled DNS/DPS where the fluid integration time step is much larger than the particle time step. The scheme is based on two- particle DNS/DPS with matching fluid and particle time steps. The visco-elastic restitution coefficient obtained in the two-particle simulations and its dependence on the collisional Stokes number is compared to experimental results.

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