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Particle Resolved Direct Numerical Simulations to Study Shock-Particle Cloud Interaction YASH MEHTA, JONATHAN D. REGELE, Los Alamos National Lab, FADY M. NAJJAR, Lawrence Livermore National Lab — Thus far, the numerical study of shock-particle cloud interactions has been confined to either using sub-grid scale models (Euler-Lagrange or Euler-Euler) or particle resolved simulations neglecting the effect of viscosity and/or particle motion due to high computational costs. With the recent development of scalable and accurate solvers along with the availability of exascale computing resources, it's now possible to perform particle resolved direct numerical simulations of shock waves interacting with a cloud of particles. In the present study, capabilities of PAWCM (Parallel Adaptive Wavelet Collocation Method) code that can solve the Navier-Stokes equations with moving colliding particles is first demonstrated. After that validation and grid resolution studies for the case of shock interacting with a single cylinder are discussed. Finally, the late-term (viscous) drag experienced by a curtain of particles after an incident-shock propagates over them is presented. Importance of fluctuating terms, which appear in the average governing equations that can be used to obtain closure models for Euler-Lagrange or Euler-Euler studies of shock-particle cloud interaction is investigated.

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