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An Euler-Lagrange method for compressible multiphase flow with application to water sound suppression GREGORY SHALLCROSS, University of Michigan, DAVID BUCHTA, University of Illinois, JESSE CAPECELATRO, University of Michigan — High-speed jets emit pressure fluctuations capable of damaging equipment and harming individuals in the vicinity of operation. It has been observed that liquid droplet injection reduces the radiated pressure fluctuations. Yet, to date, the dynamic particle-turbulence coupling with the radiated pressure fluctuations remain elusive. In this study, a volume-filtered Euler-Lagrange method is used in which the flow features are resolved on an Eulerian grid, and the particles are tracked individually in a Lagrange manner. This method is validated in a three-dimensional particle-laden shock tube for a series of volume fractions and shock Mach numbers. The results are used to evaluate the fidelity of modeling needed to capture the reported particle spreading rate and pressure distribution. The approach is then applied to simulate water-droplet injection in free-shear flow turbulence. Initial results show reductions in the radiated pressure intensity consistent with existing experimental data.

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