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LES-Style Filtering and Partly-Resolved Particles BROOKS MOSES, CHRIS EDWARDS, Stanford University — By applying LES-style spatial filtering to detailed multiphase- flow equations, we derive a set of immersed-interface equations that rigorously account for imprecise resolution of the interfaces, and are consistent with LES turbulence modeling. These equations are applicable over the entire range of atomization phenomena from nearly-fully-resolved primary breakup to evaporating near-point particles. As a demonstration, we apply the equations to partly-resolved (filter-scale) solid circular particles in 2D flow, and illustrate that these can be accurately modeled using low-order parameterizations that build on standard point-particle models, yet appropriately account for the nonzero particle diameter. From these results, we draw conclusions about the range of validity of point-particle models in turbulent LES calculations, and suggest methods of extending those models to larger non-point particles.

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