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Multiphase Modeling of Secondary Atomization in a Shock Environment JEFFREY ST. CLAIR, THOMAS MCGRATH, NSWC Indian Head EODTD, SIVARAMAKRISHNAN BALACHANDAR, University of Florida, Gainesville — Understanding and developing accurate modeling strategies for shock-particulate interaction remains a challenging and important topic, with application to energetic materials development, volcanic eruptions, and safety/risk assessment. This work presents computational modeling of compressible multiphase flows with shock-induced droplet atomization. Droplet size has a strong influence on the interphase momentum and heat transfer. A test case is presented that is sensitive to this, requiring the dynamic modeling of the secondary atomization process occurring when the shock impacts the droplets. An Eulerian-Eulerian computational model that treats all phases as compressible, is hyperbolic and satisfies the 2nd Law of Thermodynamics is applied. Four different breakup models are applied to the test case in which a planar shock wave encounters a cloud of water droplets. The numerical results are compared with both experimental and previously-generated modeling results. The effect of the drag relation used is also investigated. The computed results indicate the necessity of using a droplet breakup model for this application, and the relative accuracy of results obtained with the different droplet breakup and drag models is discussed.

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