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Investigation of the compressible MRG force model for simulations of detonation-driven particle motion – comparison against microscale experiments[1] JOSHUA GARNO, THOMAS JACKSON, S. BALACHANDAR, University of Florida — For the case of a modest air shock traversing a spherical particle, the compressible Maxey-Riley-Gatignol (MRG) force model has been shown to capture the rapid momentum exchange due to the fluid-particle interaction. With high-quality data from an explosive multiphase experiment, this work explores the predictive capability of the model in the detonation-driven flow regime. Following a UQ-driven calibration of explosive model parameters, a time-dependent simulation flow field is presented that is in agreement with experimental data. Spatial and temporal variation of flow properties on the scale of the particle are considered in the Faxén form of the particle force model, employed in the finite-volume, Euler-Lagrange simulations. Carefully-timed X-ray exposures provide the trajectories of a few tungsten particles accelerated from an initial explosion for comparison with the simulation results for evaluation of the accuracy of the force model.

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