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Predictive Capability of the Compressible MRG Equation for an Explosively Driven Particle with Validation[1] JOSHUA GARNO, FREDERICK OUELLET, RAHUL KONERU, SIVARAMAKRISHNAN BALACHANDAR, Univ of Florida - Gainesville, BERTRAND ROLLIN, Embry-Riddle Aeronautical University — An analytic model to describe the hydrodynamic forces on an explosively driven particle is not currently available. The Maxey-Riley-Gatignol (MRG) particle force equation generalized for compressible flows is well-studied in shock-tube applications, and captures the evolution of particle force extracted from controlled shock-tube experiments. In these experiments only the shock-particle interaction was examined, and the effects of the contact line were not investigated. In the present work, the predictive capability of this model is considered for the case where a particle is explosively ejected from a rigid barrel into ambient air. Particle trajectory information extracted from simulations is compared with experimental data. This configuration ensures that both the shock and contact produced by the detonation will influence the motion of the particle. The simulations are carried out using a finite volume, Euler-Lagrange code using the JWL equation of state to handle the explosive products.

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