Abstract Submitted
for the SHOCK19 Meeting of
The American Physical Society

Investigating the Detonation and Resulting Flow in an Explosive Multiphase Experiment with Uncertainty Quantification JOSHUA GARNO, FREDERICK OUELLET, RAHUL KONERU, THOMAS JACKSON, S. BALACHANDAR, University of Florida, BERTRAND ROLLIN, Embry-Riddle Aeronautical University — Up to now, the area of research in compressible multiphase flows has been void of a rigorous investigation into the validity of the compressible Maxey-Riley-Gatignol particle force equation when a high energy, post-detonation flow is imposed on the particle. Laboratory shock-tube experiments and simulations have shown that the model is able to capture the force experienced by the particle due to a passing shockwave and compressed flow, while the present work aims to assess the predictive capability of the model in the context of a single particle subjected to an oncoming detonation wave. Modeling of the gas phase receives primary focus as its evolution in the experiment must be well captured by the simulation in order to allow a justified appraisal of the particle force model. Detonation simulations employ a reactive burn model and explosive products are modeled using the JWL equation of state. High-quality experimental data permits a detailed comparison of defining gas flow features and particle trajectories between experiments and simulations. Several uncertainties, both experimental and model-related, are considered in the finite-volume Euler-Lagrange simulations.

Joshua Garno
University of Florida

Date submitted: 28 Feb 2019 Electronic form version 1.4