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Droplet tracer characterization in shock-driven multiphase flow[1]
FRANCISCO VIGIL, MIQUELA TRUJILLO, PETER VOROBIEFF, C. RANDALL TRUMAN, The University of New Mexico — Small glycol droplets have long been introduced into shock-accelerated gas as a tracer, to track the evolution of Richtmyer-Meshkov instability (RMI). However, it was observed that droplets are not passive tracers when shock-accelerated - to the extent that their introduction itself can lead to vortex formation. Because of the complex interplay between the droplets and surrounding gas, it is imperative to know the droplet size and population density. The absence of this knowledge has led to differences between results from numerical models, Planar Laser-Induced Fluorescence (PLIF) measurements, and Mie scattering observations. To gain a better understanding of the droplet velocity and inertial flow fields, a more involved study of droplet sizing is required. A Malvern laser diagnostic system is used to determine the sizes of the glycol droplets seeded into the flow. A series of tests are performed to analyze differences in glycol droplet size and population distribution that result from changing gaseous mediums in the test section. These measurements facilitate better quantification of the velocity fields in shock accelerated flow and improve interpretation of results from Mie scattering.

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