

Abstract Submitted  
for the DFD19 Meeting of  
The American Physical Society

**Velocity Measurements and Phase Tracking in a Shock-Driven Multiphase Instability** VASCO O. DUKE WALKER, JOHN MIDDLEBROOKS, ROY ALLEN, WILLIAM MAXON, ALMUHNA SAHIR , Univ of Missouri Columbia, SAMRA KARABEGOVIC, Rock Bridge H.S. Columbia, JACOB A. MCFARLAND, Univ of Missouri Columbia — An experimental investigation has been performed to study physical phenomena induced by the impulsive acceleration of a heterogeneously seeded multiphase flow-field within a shock tube system. In order to achieve this, a cylindrical interface comprising of nitrogen, seeded with micron-sized acetone droplets, was generated within the shock tube's test section and accelerated by a planar shock wave. The nitrogen gas itself was saturated with acetone vapor tracer and mixed into the interface to prevent premature droplet evaporation. The development of both the dispersed and carrier phases was captured through a series of Planar Laser Mie Scattering (PLMS) and Planar Laser Induced Fluorescence (PLIF) images, respectively. In addition, lag effects between the phases were visualized and quantified. The results were compared to simulations for validation. This experimental investigation has a multitude of applications in a variety of scientific and engineering systems; with a particular relevance to systems that involve high-speed or shock-induced multiphase combustion.

Vasco O. Duke Walker  
Univ of Missouri Columbia

Date submitted: 24 Jul 2019

Electronic form version 1.4