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Simultaneous Measurements of velocity and density in the Blast-Driven Instability[1] SAMUEL PETTER, BENJAMIN MUSCI, GOKUL PATHIKONDA, DEVESH RANJAN, Georgia Inst of Tech — The presented work focuses on implementation of Planar Laser Induced Fluorescence (PLIF) to study the Blast-Driven Instability (BDI) in the Georgia Tech Blast Wave Facility. Using detonators to generate blast waves, a gaseous, membraneless interface is subjected to the combined Richtmyer-Meshkov (RMI) and Rayleigh-Taylor Instabilities (RTI) –comprising the BDI. PLIF diagnostics are added to the currently functional particle image velocimetry (PIV) diagnostic in a synchronized manner. Simultaneous velocity fields (from PIV) and density fields (from PLIF) are recorded to observe turbulence cross statistics of the BDI for the first time. Further, the cylindrical geometry provides an important platform to collect data for validation in predictive models in flows subjected to Bell-Plesset effects in polar geometries. The aim is estimating various velocity-density cross statistics, and tuning the coefficients in RANS models that are used for predicting flows involving variable density mixing effects (such as BHR model). Ensembles of high-resolution simultaneous data are compared with high-speed data previously acquired to further study the evolution of the instability.

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