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Measurements of Transient Phenomena in a Shock Tube using Pulse-Burst PIV JUSTIN WAGNER, STEVEN BERESH, EDWARD DEMAURO, BRIAN PRUETT, PAUL FARIAS, Sandia National Laboratories —
Time-resolved particle image velocimetry (TR-PIV) measurements are made in a shock tube using a pulse-burst laser. Two transient flowfields are investigated including the baseline flow in the empty shock tube and the wake growth downstream of a cylinder spanning the width of the test section. Boundary layer growth is observed following the passage of the incident shock in the baseline flow, while the core flow velocity increases with time. Comparison of this measured core flow acceleration to that predicted using classical unsteady boundary layer growth models shows good agreement in some instances. As a result of wall boundary layers, a significant amount of spatial non-uniformity remains in the flow following the passage of the end-wall reflected shock. In the transient wake growth measurements, the wake downstream of the cylinder is symmetric immediately following the passage of the incident shock. At later times, the wake transitions to von Karman vortex shedding. The TR-PIV data are bandpass filtered about the vortex shedding frequency and its harmonics to reveal additional details on the transient wake growth.

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