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Optical diagnostics of turbulent mixing in explosively-driven shock tube[1] JAMES ANDERSON, MICHAEL HARGATHER, New Mexico Tech — Explosively-driven shock tube experiments were performed to investigate the turbulent mixing of explosive product gases and ambient air. A small detonator initiated Al / I_2O_5 thermite, which produced a shock wave and expanding product gases. Schlieren and imaging spectroscopy were applied simultaneously along a common optical path to identify correlations between turbulent structures and spatially-resolved absorbance. The schlieren imaging identifies flow features including shock waves and turbulent structures while the imaging spectroscopy identifies regions of iodine gas presence in the product gases. Pressure transducers located before and after the optical diagnostic section measure time-resolved pressure. Shock speed is measured from tracking the leading edge of the shockwave in the schlieren images and from the pressure transducers. The turbulent mixing characteristics were determined using digital image processing. Results show changes in shock speed, product gas propagation, and species concentrations for varied explosive charge mass.

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