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Reduced-Order Investigation of Volumetric PIV for Noise Source Characterization ADAM NICKELS, JEFF HARRIS, Applied Research Laboratory Pennsylvania State University, ALEXANDER MYCHKOVSKY, JAMES WISWALL, KRISTIN CODY, Naval Nuclear Laboratory, TED BAGWELL, Applied Research Laboratory Pennsylvania State University — Flow induced noise sources are often highly three-dimensional, turbulent phenomenon that require knowledge of the three-dimensional velocity-gradient tensor over significant spatial and temporal domains to fully characterize. To address these needs, volumetric-PIV is used to measure the cross-section of a turbulent jet, providing direct measurements of the time-dependent velocity-gradient tensor. Synchronously obtained acoustic pressure measurements allow for correlation of near field quantities with acoustic features of the flow. To better elucidate the spatially and temporally coherent flow features related to the acoustic source, spectral-POD is applied to the velocity field and correlated with the acoustic pressure.

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