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SPIV Measurements for Identifying Turbulence Structure in Swirling Jets ERIC DEMILLARD, POURYA NIKOUEEYAN, JONATHAN NAUGHTON, University of Wyoming — Swirling jets are of interest because they can enhance and control mixing and combustion. Several past studies have considered the turbulence statistics in swirling jets for a range of swirl number, and this behavior is now well characterized. However, there has been no attempt to date to link the statistical results to the turbulent structure in the jet. To address this, Stereoscopic Particle Image Velocimetry (SPIV) is being performed to capture instantaneous velocity fields. The resulting planes of three-component velocities are to be used in conjunction with Proper Orthogonal Decomposition (POD) to reconstruct turbulence structure. Using the POD results, comparisons can be made between the turbulence structure in the swirling jets to that of their non-swirling counterparts. Critical to this analysis are accurate two-point statistics that only result if proper care is taken during experiment setup. Errors can arise from misalignment of the laser sheet with the calibration plane, the selection of viewing angles and object distances for both cameras, and the improper selection of dual-image acquisition parameters. This work thus identifies the requirements for successful execution of SPIV measurements in swirling jets to be used for POD analysis.

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