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Coherent structure evolution in a turbulent round-jet using scanning tomographic particle image velocimetry TIERNAN CASEY, King Abdullah University of Science and Technology, Saudi Arabia, JUN SAKAKIBARA, University of Tsukuba, Japan, SIGURDUR THORODDSEN, King Abdullah University of Science and Technology, Saudi Arabia — In order to overcome the inherent spatial resolution limitations and increased noise associated with tomographic PIV when applied to large depth domains, we present a high-speed light-volume scanning technique, using up to 9 adjacent volume slices. This reduces the number of ghost particles while allowing for a large number of total depthwise reconstructed planes, up to 1500. The approach is demonstrated for a turbulent round-jet with Re = 2,500-10,000, using 4 high-speed video cameras to acquire images at up to 1,279 fps, giving over 1 million time-resolved velocity vectors with up to 520 time-steps in sequence. The evolution of tube-like coherent vortical structures are identified and tracked in time across the entire width of the jet - the dynamics of which are compared to existing experimental data using pointwise analysis of velocity gradients.

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