

Abstract Submitted
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A Comparison of 3D3C Velocity Measurement Techniques ROD-ERICK LA FOY, Virginia Tech, PAVLOS VLACHOS, Purdue University — The velocity measurement fidelity of several 3D3C PIV measurement techniques including tomographic PIV, synthetic aperture PIV, plenoptic PIV, defocusing PIV, and 3D PTV are compared in simulations. A physically realistic ray-tracing algorithm is used to generate synthetic images of a standard calibration grid and of illuminated particle fields advected by homogeneous isotropic turbulence. The simulated images for the tomographic, synthetic aperture, and plenoptic PIV cases are then used to create three-dimensional reconstructions upon which cross-correlations are performed to yield the measured velocity field. Particle tracking algorithms are applied to the images for the defocusing PIV and 3D PTV to directly yield the three-dimensional velocity field. In all cases the measured velocity fields are compared to one-another and to the true velocity field using several metrics.

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