Abstract Submitted for the DFD07 Meeting of The American Physical Society

A Cross-Correlation Based Accuracy Assessment of Tomographic **PIV** NICHOLAS WORTH, TIMOTHY NICKELS, Cambridge University — Tomographic Particle Image Velocimetry (Tomo-PIV) is a promising new PIV technique capable of producing high-frequency time-resolved full 3D velocity fields. Advantages include: higher possible resolution than Particle Tracking Velocimetry (PTV), a simpler fully digital set-up in comparison with standard Holographic-PIV, and instantaneous flow field capture as opposed to quasi-instantaneous in Scanning-PIV. However, based on previous investigations (Elsinga et al. 2005) measurement resolution appears to be somewhat limited, and although higher than PTV is still lower than other 3D techniques. However, this conclusion appears to be largely based on a correlation coefficient based accuracy assessment of artificial and reconstructed objects. Although useful, this measure may not adequately represent the accuracy of the PIV system, which is based on the cross-correlation of reconstructed objects. Therefore, in order to determine setup parameter effects more realistically, the current computational study details a cross-correlation based accuracy analysis of a simple vortical flow-field. A more direct understanding of how setup choices affect PIV results will allow the accuracy and resolution of results to be maximized, through simple parameter selection.

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