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Optimization and Application of Surface Segmentation Technique for Tomographic PIV LIUYANG DING, RONALD ADRIAN, Arizona State University, BRANDON WILSON, KATHY PRESTRIDGE, Los Alamos National Laboratory, LABORATORY FOR ENERGETIC FLOW AND TURBULENCE, ARIZONA STATE UNIVERSITY TEAM, EXTREME FLUID TEAM, P-23, PHYSICS DIVISION, LOS ALAMOS NATIONAL LABORATORY TEAM — Tomographic PIV is a widely used 3D flow measurement technique. It utilizes images recorded by multiple cameras to reconstruct the intensity distribution of a measured volume. The 3D3C velocity field is then computed by 3D cross-correlation. Surface segmentation [1] aims to reduce computational cost. It extracts from a cloud of particles an image of those particles that lie on a mathematically prescribed surface. 2D2C velocity fields are computed on stacks of orthogonal surfaces, then assembled to construct the full 3D3C velocity field. We investigate the reconstruction of adaptive surfaces aligned with the main flow direction minimizing the out-of-plane motion. Numerical assessment is performed on curved-surface reconstruction for Taylor-Couette flow. An optimizing 2D interrogation scheme involving volumetric deformation is proposed to improve the accuracy of the 3D3C velocity field. The numerical test is performed on a synthetic vortex ring showing good measurement accuracy. Experimental results measuring the shock-driven turbulent mixing will also be presented. References [1] Ziskin, I.B., R.J. Adrian, and K. Prestridge. "Volume segmentation tomographic particle image velocimetry." Proceedings of 9th international symposium on particle image velocimetry, Kobe, Japan. 2011.

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