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Iterative Reconstruction of Volumetric Particle Distribution for 3D Velocimetry BERNHARD WIENEKE, LaVision GmbH, DOUGLAS NEAL, LaVision, Inc — A number of different volumetric flow measurement techniques exist for following the motion of illuminated particles. For experiments that have lower seeding densities, 3D-PTV uses recorded images from typically 3-4 cameras and then tracks the individual particles in space and time. This technique is effective in flows that have lower seeding densities. For flows that have a higher seeding density, tomographic PIV uses a tomographic reconstruction algorithm (e.g. MART) to reconstruct voxel intensities of the recorded volume followed by the cross-correlation of subvolumes to provide the instantaneous 3D vector fields on a regular grid. A new hybrid algorithm is presented which iteratively reconstructs the 3D-particle distribution directly using particles with certain imaging properties instead of voxels as base functions. It is shown with synthetic data that this method is capable of reconstructing densely seeded flows up to 0.05 particles per pixel (ppp) with the same or higher accuracy than 3D-PTV and tomographic PIV. Finally, this new method is validated using experimental data on a turbulent jet.

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