

Abstract Submitted
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Robust 4 Camera 3D Synthetic Aperture PIV ABHISHEK BAJPAYEE, ALEXANDRA TECHET, MIT — We present novel processing techniques which allow for robust 4 camera 3D synthetic aperture (SA) PIV. These pre and post processing techniques, applied to raw images and reconstructed volumes, significantly improve SA reconstruction SNR values and consequently allow for accurate SAPIV velocity fields. SA, or light field, PIV has typically required 8 or 9 cameras in order to achieve high reconstruction quality and velocity field reconstruction quality values, Q and Q_v respectively. This is primarily because the effective signal to noise ratio (SNR) of refocused images, when using traditional multiplicative or additive refocusing techniques, increases with the number of cameras being used. However, tomographic reconstruction (used with TomoPIV), is able to achieve relatively high SNR reconstructions using 4 or 5 cameras owing to its iterative but significantly more computationally expensive algorithm. Our processing techniques facilitate better recovery of relevant information in SA reconstructions using only 4 views. As a result, we no longer have to trade setup cost and complexity (number of cameras) for computational speed of the reconstruction algorithm.

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