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Improving accuracy of Plenoptic PIV using two light field cameras BRIAN THUROW, TIMOTHY FAHRINGER, Auburn University — Plenoptic particle image velocimetry (PIV) has recently emerged as a viable technique for acquiring three-dimensional, three-component velocity field data using a single plenoptic, or light field, camera. The simplified experimental arrangement is advantageous in situations where optical access is limited and/or it is not possible to set-up the four or more cameras typically required in a tomographic PIV experiment. A significant disadvantage of a single camera plenoptic PIV experiment, however, is that the accuracy of the velocity measurement along the optical axis of the camera is significantly worse than in the two lateral directions. In this work, we explore the accuracy of plenoptic PIV when two plenoptic cameras are arranged in a stereo imaging configuration. It is found that the addition of a 2nd camera improves the accuracy in all three directions and nearly eliminates any differences between them. This improvement is illustrated using both synthetic and real experiments conducted on a vortex ring using both one and two plenoptic cameras.

Brian Thurow
Auburn University

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