

Abstract Submitted
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3-D 3-C Layered Micro-PIV MATTHEW POMMER, ANDREW KIEHL, CARL MEINHART, University of California Santa Barbara — A method to estimate three-components of velocity in a micro-flow has been developed using a micron-resolution Particle Image Velocimetry (micro-PIV) technique (Meinhart et al. 1999) to resolve a number of velocity-vector fields spaced in the out-of-plane direction. A fourth-order accurate finite differencing algorithm is used to estimate the out-of-plane component of velocity at each point in the flow by solving the continuity equation. An experiment was completed to estimate flow around an adherent red blood cell. In that experiment, fourteen velocity-vector field layers each spaced 0.88 microns in the out-of-plane direction were resolved using the micro-PIV technique. A numerical simulation of flow around a rigid hemispherical protrusion (the size of the red cell) was used to estimate the accuracy of the post-processing algorithm to be within one percent. The numerical simulation was also compared to experimental results of flow around a red cell to show agreement. We will discuss the experimental results, accuracy, limitations, and applications of this method.

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