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Microscopic Light Field Particle Image Velocimetry TADD TRUSCOTT, BRYCE MCEWEN, Brigham Young University, JESSE BELDEN, Naval Undersea Warfare Center — This work presents the development and analysis of a system that combines the concepts of light field microscopy (Levoy 2006) and particle image velocimetry (PIV) to measure 3D velocities within a micro-volume. Flow at Reynolds numbers in the range of 0.02 to 0.03 was seeded with fluorescent particles and pumped through a micro-channel. The images were post processed to render a stack of 2D refocused images resulting in a 3D focal stack. Subsequently, a multi-pass, 3D PIV algorithm was used to measure channel velocities. Results from PIV analysis were compared with an analytical solution for fully developed cases, and with CFD simulations for developing flows. The relative error and advantages / disadvantages of this system will be presented.

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