

Abstract Submitted
for the DFD19 Meeting of
The American Physical Society

Structured-illumination microscopy to improve the spatial resolution of microscale particle velocimetry¹ MICHAEL SPADARO, MINAMI YODA, Georgia Institute of Technology — The spatial resolution of optical methods in microchannel flows such as microscale particle image velocimetry (μ PIV) is often limited because the entire flow volume is illuminated, and signal from tracers beyond the focal plane affects the measurement. Structured-illumination microscopy (SIM), originally developed for optical sectioning of stationary objects (*e.g.* cells) in fluorescence microscopy, is a promising way to acquire planar slices of the flow with a thickness comparable to the depth of field of the imaging system. SIM reconstructs the signal from the focal plane using multiple “raw” images of the flow illuminated by a sinusoidally varying (*i.e.*, structured) intensity distribution at different phases using (spatial) frequency mixing. Initial results are presented here for microscale particle velocimetry using SIM images reconstructed from two raw images of laminar Poiseuille flow seeded with fluorescent polystyrene microparticles through a microchannel. The velocities obtained using SIM-based particle velocimetry are compared with results obtained from “standard” μ PIV obtained with volume illumination in the same flow, and used to estimate the spatial resolution of this new technique.

¹Supported by US Army Research Office

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Date submitted: 31 Jul 2019

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