Abstract Submitted
for the DFD19 Meeting of
The American Physical Society

Off-axis digital holographic microscopy (DHM) as a method of high temporal and spatial resolution flow visualization[1] MANUEL BEDROSSIAN, Department of Medical Engineering, California Institute of Technology. 1200 E. California Blvd. Pasadena CA 91125, KURT LIEWER, CHRIS LINDENSMITH, Jet Propulsion Laboratory, California Institute of Technology. 4800 Oak Grove Dr. Pasadena CA, 91011, JPL-NEXT TEAM — Off-axis digital holographic microscopy is a developing optical modality that is capable of achieving diffraction limited resolution on the sub-micron spatial scale at high temporal resolution and across a large depth of field. By using two coherent beams of light that become recombined at the optical detector, off-axis of each other, the 3D optical information of the sample becomes encoded in the resulting interference pattern (hologram). Numerical processing of the hologram allows the volumetric reconstruction of the sample. The temporal resolution is limited by the frame rate of the camera used to record the holograms and thus dynamic processes such as fluid flows can be imaged and visualized by seeding the flow with appropriately sized particles. Our current implementation of an off-axis DHM is capable of diffraction limited resolution of 780 nm across an interrogation volume of 365x365x900 cubic microns. Hardware and software developments in off-axis DHM show this optical modality to be a promising method of high throughput flow visualization on the microscale.

[1]Funding for this project was provided by the JPL-NEXT program.

Manuel Bedrossian
Department of Medical Engineering, California Institute of Technology

Date submitted: 05 Aug 2019 Electronic form version 1.4