

Abstract Submitted
for the DFD20 Meeting of
The American Physical Society

Analyzing Cytoplasmic Flow using Digital Inline Holography¹ ZILONG HE, JIARONG HONG, University of Minnesota — Macromolecules within cytoplasm undergo diffusive motion in different modes including sub-diffusion, hindered, and enhanced diffusive. In larger cells ($D > 0.1$ mm), different topologies of cytoplasmic streaming (rotational streaming, correlated random flow, circulation streaming, etc.) are observed, functioning to promote diffusion transport. These kinds of cytoplasmic flow provide valuable insights on the cell activities and transport phenomena within the cell. However, prior method of studying cytoplasmic flows, including fluorescence recovery after photobleaching and force spectrum microscopy, are indirect and time-consuming and requiring advanced instrumentation. In comparison, digital inline holography (DIH) is a non-invasive imaging technique that can directly probe into the diffusive phenomena in the cytoplasm with very low energy dose required for illumination. Here we employ DIH to probe into the cytoplasmic flows of budding yeast and investigate the change of diffusive motions within the cytoplasm at different stages of a cell division cycle. Our results show DIH can serve as a promising tool to probe different modes of cytoplasmic flows and characterize the change of cell activities.

¹Minnesota Partnership for Biotechnology and Medical Genomics grant for the University of Minnesota and Mayo Clinic

Zilong He
University of Minnesota

Date submitted: 02 Aug 2020

Electronic form version 1.4