University of Miami, Physics Department Colloquium

Date: Wednesday, Nov 30, 2022
Time: 4:00 pm – 5:00 pm
Location: Zoom Meeting - Online

Towards Understanding Hydrodynamics of Aquatic Organisms via Microfluidics

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Abstract

Climate change threatens the biodiversity of our planet. In particular, the negative impacts of climate change on aquatic organisms and their ecosystems are well-documents. Beyond the loss of commercial fishing, the loss of aquatic biodiversity could hinder future discoveries and negatively impact human health and commerce. Our lab seeks to investigate the hydrodynamics of aquatic organisms, develop metrics and models, and predict the interplay between climate-caused factors and the development/homeostasis of aquatic organisms. I will first describe our efforts in developing an inexpensive selective plane illumination microscope that can be readily integrated with fluidic systems (SPIM-Flow). Utilizing SPIM-Flow, we have investigated the hydrodynamics of freely moving Hydra. Our experiments across multiple animals indicated animals' health inside the system (e.g., feeding on a chip). Next, we used SPIM-Flow to investigate Hydra's response to flow (i.e., controlling for shear stress and direction). Finally, utilizing video-analysis, we have begun to quantify the hydrodynamic lifestyle of Hydra. Next, I will describe our progress in utilizing microfluidics to characterize the vortex patterns generated by sand dollar larvae's swimming/eating behavior. These baseline measurements describe our lab's initial steps toward understanding the interactions between hydrodynamics and environmental perturbations caused by climate change.