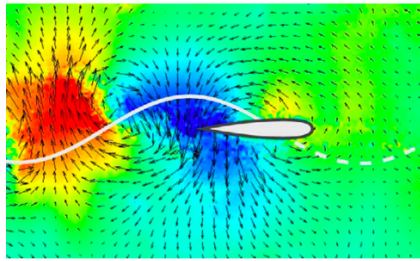
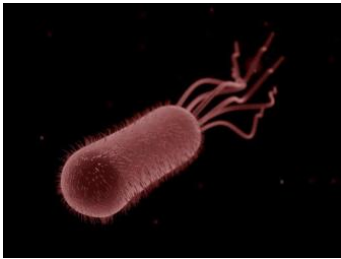


ME 491-004: Fluid Dynamics of Swimming and Flying

University of Hawai'i at Mānoa, Fall 2024

Instructor: Assistant Prof. William Uspal (uspal@hawaii.edu)



Description: This course will provide an introduction to animal and robotic locomotion in a fluid medium. We will explore the Stokesian and Eulerian limits that distinguish microscopic and macroscopic self-propulsion. For microscopic swimmers, we will consider swimming strategies that evade Purcell's scallop theorem, with applications to microrobotics. For macroscopic animals, we will give an overview of fixed-wing flight, and then cover flapping flight and fish locomotion. Articles from the recent literature will be discussed.

Lecture period: Tuesdays & Thursdays, 1:30-2:45 pm, Holmes 309.

References: No textbook will be required. We will draw from the following sources, among others:

The Fluid Dynamics of Cell Motility, Eric Lauga.
Fundamentals of Aerodynamics, John Anderson.
Life in Moving Fluids: The Physical Biology of Flow. S. Vogel.
The Simple Science of Flight, Henk Tennekes.
Review papers in *The Annual Review of Fluid Mechanics*.

Prerequisites: ME 322, or consent of instructor.

Grade: Homework 25%, Midterm 25%, Course project 25%, Final exam 25%.