Weekly Seminar: Fall 2010

Date: Friday November 5

Time: 11:00 AM

Location: Maryland Hall 110

Speaker: Jeannette Yen (Georgia Tech.)

Title: *"Aquatic Propulsion in An Intermediate Reynolds Number Regime: Comparative Analysis of 3 Propulsive Mechanisms"*

Abstract

Fascinating studies of terrestrial locomotion by kangaroos, lizards and crabs, flight by bats, birds, and insects, and propulsion by fish, frogs, and flagellated organisms have stirred the imagination of biologists and provoked the curiosity of physical scientists. In response, we have engaged both biological oceanographers and fluid dynamic engineers to perform similar studies of plankton. Plankton are aquatic organisms that form the base of the aquatic food web and therefore, aquatic ecosystem balance depends on their survival. The term plankton is derived from the Greek word πλανκτος ("planktos"), meaning "wanderer" or "drifter". From quantitative analyses of three-dimensional trajectories, propulsion and morphology, and small-scale turbulence, we learn that plankton often do not go with the flow. Plankton operate at intermediate Reynolds numbers, generating watery signals that can be attenuated by viscosity and confused with small-scale turbulence. Yet messages are created, transmitted, perceived and recognized. These messages guide essential survival tasks of aquatic organisms. At the small-scale where biologically-generated behavior differs from physically-derived flow, we find plankton self-propel themselves, are aware of each other, and evolve in response to the fluid environment in surprising ways.