



**The Center for Control, Dynamical Systems, and Computation
University of California at Santa Barbara
Winter 2009 Seminar Series
Presents**

Dynamics of Aquatic Locomotion

**Eva Kanso
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Friday, February 13, 2009 3:00 - 4:00pm Chem 1171

Abstract:

The net locomotion of a deformable body submerged in an infinite volume of fluid depends critically on the dynamic coupling between the body deformations and the unsteady motion of the surrounding fluid. A mathematical description of this coupling at finite Reynolds numbers would require taking into account the detailed effects of viscosity which are primarily manifested in the dynamics of the thin shear layers around the body that separate at the body tail to create vortical structures. In this talk, we propose idealized models for the swimming of a submerged body in a perfect fluid in response to: (1) prescribed (actively controlled) shape deformations; (2) the presence of ambient vorticity; and (3) the effect of vorticity shed periodically from the body tail. This low-order modeling approach allows one to isolate and examine the role of the vorticity in achieving a net locomotion. We also discuss a simple model for the wake interactions in large fish schools. In this preliminary work on fish schooling, we ignore the fish and focus on the interaction of multiple wakes where each wake is modeled as an inverse von Karman street. In particular, we investigate the problem of fluid transport between adjacent streets for its relevance to understanding the transport of oxygen and nutrients to inner fish in large schools as well as understanding flow barriers to passive locomotion.

About the Speaker:

Eva Kanso is an assistant professor in the department of Aerospace and Mechanical Engineering at the University of Southern California (USC). Prior to joining USC, she held a two-year post-doctoral position at Caltech starting August 2003. She received her Ph.D. degree in Mechanical Engineering from the University of California, Berkeley in 2003. Her current work on aquatic locomotion is supported by the National Science Foundation through the CAREER award CMMI 06-44925 and the award CCF 08-11485.
