



**The Center for Control, Dynamical Systems, and Computation  
University of California at Santa Barbara  
Fall 2006 Seminars  
Presents**

## **Oscillatory Methods for Coordinated Control with Limited Communication**

**by Prof. Kristi Morgansen  
University of Washington**

**Friday, November 17th, 2006 3:00pm-4:00pm Frank Hall 4164**

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### **Abstract:**

Recent work in coordinated control of vehicle systems has shown that earlier studies in mathematics, physics, and chemistry with models of interconnected oscillators can be used to construct controls for coordinated vehicles. Additionally these oscillator models have been demonstrated to have direct connection to Frenet-Serret models of dynamics for nonholonomic systems (e.g. ground vehicles, fixed-wing aircraft, and underwater vehicles). The work presented here will address the construction of controls for oscillator-based analysis that allow a group of vehicles to track a moving target. Further, when these models are considered in a discrete time setting, effects of intermittent, dynamic and asynchronous communication can be incorporated into the dynamics. Stability bounds for particular group modes of behavior (identical heading or common point of rotation) can then be determined in the context of limited communication. Results are demonstrated in simulation with applications drawn from the engineering contexts of autonomous air and underwater vehicles as well as the biological context of schooling fish.

### **About the Speaker:**

Kristi Morgansen received a B.S. and a M.S. in Mechanical Engineering from Boston University, respectively in 1993 and 1994, an S.M. in Applied Mathematics in 1996 from Harvard University and a Ph.D. in Engineering Sciences in 1999 from Harvard University. Until joining the University of Washington, she was first a postdoctoral scholar then a senior research fellow in Control and Dynamical Systems and Mechanical Engineering at the California Institute of Technology. She has been an assistant professor in the Department of Aeronautics and Astronautics and the Clare Boothe Luce Assistant Professor of Engineering since the summer of 2002.

Professor Morgansen's research interests focus on control methods for nonlinear and coordinated control systems. Current topics include the use of fin-actuated propulsive methods for locomotion and active flow control, control of coordinated systems with communication constraints, vision-based sensing for state estimation, and learning methods for nonlinear systems.

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