DEPARTMENT OF MECHANICAL ENGINEERING

The Sidney E. Fuchs Seminar Series

3:30-4:30pm, Friday, August 31, 2012

Frank H. Walk Design Presentation Room

Formation Control of Multi-Agent Systems

by **Marcio de Queiroz***

Associate Professor, Mechanical and Industrial Engineering, LSU

This talk is devoted to the decentralized formation control of multi-agent systems moving in the plane. Rigid graph theory is a natural tool for describing the formation shape and the inter-agent sensing and communication network topology. Therefore, we will begin with a primer on graph theory. Using single- and double-integrator agent models, we propose new distributed control laws to asymptotically stabilize the inter-agent distance error dynamics. Our approach exploits the infinitesimal and minimal rigidity of the undirected graph that models the formation. A Lyapunov-based analysis shows that these two properties are necessary conditions for asymptotic stability. The control, which is explicitly dependent on the graph rigidity matrix, is derived for a class of potential functions. An example potential function is then used as a demonstration and simulation results are presented.

* Marcio de Queiroz received a B.S. Degree in Electrical Engineering from the Federal University of Rio de Janeiro, Brazil, a M.S. Degree in Mechanical Engineering from the Pontifical Catholic University of Rio de Janeiro, Brazil, and a Ph.D. Degree in Electrical Engineering from Clemson University in 1997. From August 1997 to August 1998 he was a Post-Doctoral Researcher at the Rotating Machinery and Controls Laboratories of the University of Virginia. From September 1998 to May 2000, he was a Visiting Assistant Professor at the Department of Mechanical Engineering of the Polytechnic University, Brooklyn, NY. In July 2000, he joined the Department of Mechanical Engineering at Louisiana State University, where he is currently an Associate Professor holding the Roy O. Martin Lumber Company Professorship. In 2005, he was the recipient of the NSF CAREER award. His research interests include nonlinear control theory and applications, active magnetic and mechanical bearings, and biological/biomedical system modeling and control.