

The University of Cincinnati
aerospace engineering & engineering mechanics

GRADUATE SEMINAR

Coordinated/Cooperative Control of Air and Space Vehicles

Dr. Jason Mitchell
AFRL/Air Vehicles Directorate
Wright-Patterson Air Force Base

Date: February 21, 2003
Time: 3:00 - 4:00 pm
Place: 757 Baldwin Hall

ABSTRACT

The coordinated/cooperative control of autonomous vehicle formations has emerged as a topic of significant interest to many organizations. Example applications of this technology include coordination of mobile robots used for search and rescue missions, cooperative decision-making and control of uninhabited air-vehicles, and formation flying for clusters of microsatellites. In particular, both NASA and the US Air Force have identified microsatellite formation flying as a critical-enabling advanced technology for near-term missions, e.g. Terrestrial Planet Finder (TPF). For satellites, the benefits derived from using this mission model, as compared to the monolithic satellite model, include graceful performance degradation, reduced failure risk, improved remote sensing resolution with distributed aperture, mission re-tasking through reconfiguration, and exploitation of economies of scale in manufacturing. As a result of this interest in spacecraft formation flying, significant effort has been expended within AFRL to understand and model relative motion dynamics and to develop control strategies that meet mission requirements while minimizing fuel usage. From this perspective, we discuss recent and current coordinated/cooperative control research in AFRL/VACA with a specific focus on microsatellite formation flying.

BIOGRAPHICAL SKETCH

Dr. Mitchell is a Visiting Scientist at the Air Force Research Laboratory, located at Wright-Patterson AFB, in the Control Theory Optimization Branch of the Air Vehicles Directorate. He received his Ph.D. in Aerospace Engineering from the University of Cincinnati in June 2000. He also holds an M.S. in Aerospace Engineering and a B.S. in Engineering Mechanics, both from the University of Cincinnati. He is an active member of the American Astronautical Society and the American Institute of Aeronautics and Astronautics. He received a National Research Council Post-Doctoral Research Associateship Award for three consecutive years, and obtained a NASA Graduate Student Researcher Program Fellowship. He is currently investigating the effect of information flow constraints on cooperative decision and control algorithms for autonomous vehicle teams.