The Department of
Mechanical Engineering – Engineering Mechanics
Proudly Presents
Professor John L. Crassidis
University at Buffalo, State University of New York

Dr. John L. Crassidis is a Professor of Mechanical and Aerospace Engineering at the University at Buffalo (UB), State University of New York. He received his B.S., M.S., and Ph.D. in Mechanical Engineering from the State University of New York at Buffalo specializing in robust state estimation techniques and dynamics. Before joining UB in 2001, he held previous academic appointments at the Catholic University of America (1996-98) and Texas A&M University (1998-2000). He also held a position as a NASA Postdoctoral Research Fellow at Goddard Space Flight Center (1996-1998), where he worked on a number of missions and research ventures. He has received two best paper awards from the American Institute of Aeronautics and Astronautics (AIAA) Guidance, Navigation and Control (GN&C) conferences, one for determining leaks on the International Space Station from attitude response data and one for the development of a robust estimation approach for spacecraft attitude determination. He was also awarded the Society of Automotive Engineers' Ralph R. Teetor Educational Award and AIAA's Sustained Service Award. He was past Chair of the AIAA National Technical Committee on GN&C and is currently Associate Editor of the AIAA Journal of Guidance, Control, and Dynamics.

Thursday, Mar. 26, 2009   3:00 – 4:00 p.m.   Room 112, ME-EM Bldg.

Deterministic Relative Attitude Determination of Formation Flying Vehicles

Attitude determination is the process of estimating the three-axis orientation of vehicle from various measurements, such as line-of-sight vectors. Determining the global (inertial) attitude of a vehicle has been extensively studied in the past. This presentation focuses on various approaches for relative attitude determination of a formation of vehicles. The results provide an assessment on the accuracy of the deterministic attitude solutions, given statistical properties of the assumed noisy measurements. Formation flying employs multiple vehicles to maintain a specific relative attitude. Applications are numerous involving all types of vehicles, including land (robotics), sea (autonomous underwater autonomous vehicles), space (spacecraft formations) and air (uninhabited air vehicles) systems. A formation of three vehicles is considered here in which each vehicle is equipped with sensors to provide line-of-sight, and possibly range, measurements between them. Three cases are shown. The first case determines the absolute (inertial) attitude of a vehicle knowing the absolute positions of the other two. The second case involves parallel beams between each vehicle, and the third case involves non-parallel beams which requires range information to find deterministic attitude solutions. Covariance analyses are provided to gain insight on the stochastic properties of the attitude errors for all three cases.