Seminar Series of the

**AFRL/VA and AFOSR**

## Collaborative Center of Control Science (CCCS)

# Advanced Guidance and Control for Reusable Launch Vehicles

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**Abstract:** Advanced guidance and control (AG&C) technologies are critical for meeting safety, reliability, and cost requirements for the next generation of reusable launch vehicle (RLV). This becomes clear upon examining the number of expendable launch vehicle failures in the recent past where AG&C technologies could have saved a RLV with the same failure mode, the additional vehicle problems where this technology applies, and the costs and time associated with mission design with or without all these failure issues. The state-of-the-art in guidance and control technology, as well as in computing technology, is at the point where we can look to the possibility of being able to safely return a RLV in any situation where it can physically be recovered. This seminar will outline reasons for AG&C, current technology efforts, and the additional work needed for making this goal a reality. There are a number of approaches to AG&C that have the potential for achieving the desired goals. The seminar will briefly describe some of these methods and compare the results of tests designed to demonstrate the achievement of the goals. The seminar will list the test cases used to demonstrate that the desired results are achieved, briefly describe an automated test scoring method, and display results of the tests. Some of the technology components have reached the maturity level where they are ready for application to a new vehicle concept, while others are not as far along in development.

**Biography:** Dr. Hanson earned his Ph.D. degree in Aerospace Engineering from the University of Michigan in 1983. Prior to his NASA employment, he worked at the ANSER Corporation, where he studied sensor systems, satellite constellations, and orbital mechanics. Since coming to NASA, he has done research and applied work in trajectory optimization, guidance schemes, and automated rendezvous. He is currently Lead of Marshall Space Flight Center's Trajectory and Guidance Team. He is also the principal investigator for a project titled Integration and Testing of Advanced Guidance and Control Technologies, developing new methods for reusable space vehicles to improve safety and reduce cost.