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2007-2008 Monthly Seminar Series on Space Research

18 October, 15 November, **17 January**, 21 February, 17 April, 15 May
3rd Thursday 4:00-5:00 pm

Atmospheric Guidance for Spacecraft Entry, Descent and Landing

Professor K. D. Mease
Mechanical and Aerospace Engineering
University of California, Irvine

Date**: 17 January 2008 Thursday** Time: **4:10-5:00 pm** Location: **1062 Bainer**
Refreshments will be provided at 4:00 p.m.

ABSTRACT

Hosted by: Professor Ron Hess

Plans for large payload robotic missions to the ancient highlands of Mars and for human Mars missions are driving the development of entry, descent, and landing technology. For the next generation of robotic missions, it is desired to land 0.8 - 2.0 t payloads within 10 km or less of the specified landing site at an elevation of +2 km Mars orbiter laser altimeter or more. Human missions require landing 40-80 t within 100 meters. To accommodate the large masses it is likely that higher ballistic coefficient landers will be used and require higher lift to achieve the higher elevation landing sites. With higher ballistic coefficient comes the potential for higher heat flux and the need to fly the lander in a such a way that the heat flux does not exceed the vehicle limits.
The responsibility of hypersonic entry guidance is to command the control variables -- bank angle and possibly the angle of attack -- during the atmospheric flight that deliver the vehicle to a desired state for parachute deployment and keep the vehicle and payload within heating and acceleration limits along the way. An overview of the technical challenges for entry guidance and approaches we have developed to meet these challenges will be presented. These entry guidance approaches have been implemented in algorithms that have been tested extensively in computer simulations. The most recent work concerns the development of guidance algorithms to support Mars precision landing and a Crew Exploration Vehicle flight test.

ABOUT THE SPEAKER

Kenneth D. Mease is Professor of Mechanical and Aerospace Engineering at the University of California, Irvine. He held positions at the JPL and at Princeton University before joining the faculty of UC Irvine. His research has contributed to the guidance, navigation and control of aircraft and spacecraft, time-scale decomposition for nonlinear dynamical systems, and molecular control, and has been sponsored by NASA, the JPL, NSF, McDonnell Douglas Corporation, Rockwell International Corporation, and Boeing. He has consulted and had contracts with Universal Space Lines, Optimal Synthesis and Guided Systems Technologies. He has served as Associate Editor for the AIAA Journal of Guidance, Control, and Dynamics and the AAS Journal of the Astronautical Sciences. He is an Associate Fellow of the AIAA, a Member of SIAM and the SAE Control and Guidance Systems Committee.

For more information about
SpaceED (Space Engineering Research and Graduate Program) or the seminars please contact
Professor Nesrin Sarigul-Klijn at (530)-752-0682 or nsarigulklijn@ucdavis.edu
Members of the campus community and visitors from the region are welcome to attend the seminar series.
Sign-in is required at the event. SpaceED seminar will replace MAE297 seminar on 3rd Thursdays.

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