THE WILLIAM E. BOEING DEPARTMENT OF
AERONAUTICS & ASTRONAUTICS

... welcomes ...

JOHN L. JUNKINS

TEXAS A&M UNIVERSITY

Analytical Dynamics, Optimal Control & Uncertainty Quantification Aspects of Space Situational Awareness

The historical slow growth of orbital debris accelerated dramatically during recent years, primarily because we have witnessed two large spacecraft collision events: The 2007 deliberate space weapon intercept of a defunct communications satellite by the Chinese government, and the 2009 accidental collision of a Soviet derelict satellite with an Iridium communications satellite. These two events, aside from motivating the recent movie "Gravity," created large debris clouds that more than doubled the number of trackable objects in Earth orbit and greatly increased the probability of further collisions. Orbit debris growth is potentially a "avalanche" phenomenon whereby the probability of collision may grow to a point that certain altitudes become too hazardous for humans and also the insurance rates could conceivably become too high for commercial space use of come orbit regimes. Along with about 2000 satellites, there are already over 20,000 pieces of "space Junk" larger than 10cm in diameter and millions of smaller pieces of debris. As a consequence, the probability of collision is growing. As one measure, the International Space Station must now maneuver about three times per year to avoid the possibility of a collision. The dependence of our current civilization (TV, internet, data and telephone communications; navigation; climate/weather monitoring; defense /military...) and the vulnerability of the (especially) western economies on space assets is obvious. What are we spacefaring nations to do about this growing hazard? In this lecture, I describe some aspects of this challenge and also summarize some recent work that my group has done to build the insights and technology base to arrest the growth and mitigate some of the most hazardous debris. I will alternate presenting some interesting mechanics, mathematics and computational issues with some laboratory experiments for those who wish to see the near-term relevance of our work in this area of astrodynamics.

WILLIAM E. BOEING
DEPARTMENT OF AERONAUTICS & ASTRONAUTICS
UNIVERSITY of WASHINGTON

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Guggenheim 211D, UW Seattle

RSVP: http://goo.gl/forms/wd0xCo2u30jVG7HX2