

# **Value Analysis for Orbital Debris Removal: Presentation by Leonard Vance (Engineering class of 1983) at Harvey Mudd College**

**November 10, 2010**

## **Abstract:**

Multiple recent events involving collisions with commercial satellites have brought forward concerns about continuing orbital environmental deterioration. This presentation derives first order monetary benefits for removing individual small and/or large debris objects from the high value sun-synchronous orbits. These analyses are intended to serve as an economic metric by which various debris removal methods can then be evaluated.

An introduction to astrodynamics will precede this discussion, for the purpose of giving the attendees a basic understanding of orbital mechanics as related to the debris problem. This will be followed by a brief discussion of recent impact events and their effect on the orbital environment. Finally, the value of actually removing orbital debris is derived using a combination of techniques culminating in a present value analysis.

## **Speaker's Bio:**

Leonard Vance is a Senior Engineering Fellow at Raytheon Missile Systems, Tucson Arizona. He is the acting chief engineer for the Raytheon Missile Space Applications Directorate. Hired by legacy Hughes Aircraft 1983, he served as system engineering lead for the LEAP kinetic kill vehicle and AIM-9X short-range missile programs. More recently, he served as the chief engineer on the KEI (Kinetic Energy Interceptor) and NFIRE (Near Field Infra-Red Experiment) programs. He has 26 years of experience in space and airborne interceptors and is a veteran of 18 atmospheric and space intercept tests.

Education: BS Engineering from Harvey Mudd College 1983, and Masters of Engineering from Harvey Mudd College 1985