



Department of Engineering  
Seminar Program  
Wednesday, Feb 1, 2017  
Shanahan Teaching and Learning Center  
Lecture Hall 1430, 4:15pm

## **“A Physics-based Test and Evaluation Methodology for High-fidelity Dynamic Thrust Measurements of Ground Tested Propulsion Systems”**

*Dr. Brian Olson*

### **Summary:**

Next-generation “hit-to-kill” guided interceptor missiles require stringent thruster performance of the kinetic warhead Divert and Attitude Control System (DACS) to defeat stressing enemy threats in the exoatmosphere. High fidelity dynamic thrust measurements of ground-tested DACS units require an integrated approach involving a custom 6-degree-of-freedom thrust test stand, modal characterization of the ground test configuration, and an inverse dynamics methodology to estimate free-flight-representative thruster forces based on a network of thrust stand force sensors. An inverse force identification methodology is used to estimate the net dynamic forces generated by axial pairs of DACS thrusters using measurements from a planar array of thrust stand force sensors. This dynamic compensation process directly targets structural vibration modes (test artifacts) for removal without appreciably affecting the “true” thrust (or flight-configuration self-induced vibration environment), which effectively increases the thrust stand measurement bandwidth capability and significantly improves the resolution of dynamic thrust events compared to conventional methodologies.

### **Bio:**

Dr. Brian Olson is a Senior Engineer and Section Supervisor in the Air and Missile Defense Sector at JHU/APL, the largest university affiliated research center in the nation. Dr. Olson joined JHU/APL in 2006 after receiving the BS, MS, and PhD degrees from Michigan State University. He leads a team of engineers to apply innovative dynamics tools and methodologies to solve complex interdisciplinary problems that affect programs of national importance. Dr. Olson is also an active JHU/APL recruiter with a demonstrated history of helping talented graduate and undergraduate students find rewarding positions throughout the JHU/APL enterprise.

*After the seminar there will be an informal dinner and conversation with the speaker in the Rose Hills PDR at Hoch-Shanahan Dining Hall. If you are not on the meal plan, we will have a signup sheet. If you are interested in attending, please RSVP with Sydney Torrey at [storrey@hmc.edu](mailto:storrey@hmc.edu).*