The AAE Fall 2016 Colloquium Series Presents

“Methods in Horizon-Based Optical Navigation for Autonomous Spacecraft”

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Abstract
New and ambitious mission concepts under consideration by NASA and other space agencies have sparked an intensified interest in optical navigation (OPNAV). The primary attraction of OPNAV techniques is that they allow for fully autonomous onboard navigation, thus reducing or removing the requirement for ground-based tracking. Such a capability is especially important for crewed missions that must be capable of safely returning to Earth after a communication system failure or for deep-space missions where light time-of-flight precludes ground-in-the-loop navigation. In this seminar, we will focus on recent advances in horizon-based techniques for precision OPNAV. We will explore a number of geometric properties that provide valuable insight into the fundamental workings of OPNAV solution methods and will discuss new approaches for accurate planetary limb localization in an image. Performance will be shown along a reference lunar return trajectory and various OPNAV algorithms will be compared.

Bio
Dr. John Christian is an aerospace engineer with expertise in spacecraft navigation and space systems. He is the director of the Applied Space Exploration Laboratory (ASEL) and an Assistant Professor in the Department of Mechanical and Aerospace Engineering (MAE) in the Benjamin M. Statler College of Engineering and Mineral Resources at West Virginia University (WVU). Prior to joining the faculty at WVU, Dr. Christian worked as an engineer in the Guidance, Navigation, and Control (GNC) Autonomous Flight Systems Branch at the NASA Johnson Space Center in Houston, TX. Dr. Christian has experience with navigation system design, autonomous vehicles, flight tests of relative navigation sensor hardware (e.g. STORRM experiment on STS-134), Inertial Measurement Unit (IMU) data processing, and space systems analysis. He has been involved with numerous NASA flight projects. Dr. Christian holds a Ph.D. in aerospace engineering from the University of Texas at Austin, and a B.S. and M.S. in aerospace engineering from the Georgia Institute of Technology. He is active in the American Institute of Aeronautics and Astronautics (AIAA) where he is currently an associate editor of the Journal of Spacecraft and Rockets and has previously served as Chairman of the Society & Aerospace Technology Technical Committee.