

**Department of Mechanical and Aeronautical Engineering
College of Engineering and Applied Sciences
Western Michigan University**

Invited Lecture

Model Based Performance and Health Assessment of Aircraft Engines

Dr. Sanjay Garg

NASA Glenn Research Center, Cleveland, Ohio

9:30am-10:30am, Thursday, 12 November 2009
Room D-115, Engineering Building, Parkview Campus, WMU

The performance and health of an aircraft engine changes with usage. Additionally the key performance and safety indicators such as Thrust and Stall Margin, respectively, are unmeasurable. Model-based approach to estimating engine performance and health to be able to directly control these unmeasurable quantities, as well as perform on-line diagnostics, is an emerging research area. The condition of an engine is estimated using a set of health parameters which are updated such that the outputs of the on-board engine model match the sensor measurements. The challenge in aircraft engine health assessment is that typically the number of sensors available is less than the number of health parameters, which results in an underdetermined problem. The conventional approach is to estimate a subset of health parameters using Kalman Filter approach. Although such an approach might provide a good match with the sensor measurements, it can result in significant errors in the estimation of actual engine performance and health. This presentation will provide an overall perspective of the challenge of aircraft engine performance and health assessment, and will present results from an approach developed recently which determines an “optimal” set of tuners for the on-board model such that the estimation error in the unmeasured parameters of interest is minimized. This research is being conducted in support of the Integrated Vehicle Health Management project under the NASA Aviation Safety Program.

Biography

Dr. Sanjay Garg received the Ph.D. degree in Aeronautics from Purdue University. Dr. Garg has worked at NASA Glenn Research Center (GRC) since 1988. At GRC, Dr. Garg is responsible for the development of advanced dynamic modeling, health management, and control design and implementation technologies for application to current and future aerospace propulsion systems. Dr. Garg has authored over 60 technical papers, and served as journal editor and chairs of national and international conferences. Dr. Garg is a recipient of the NASA Medal for Exceptional Achievement and a NASA fellowship for the Program for Management Development at Harvard Business School.

For information, please contact Dr. William Liou at 276-3430.