



NASA SBIR 2011 Phase I Solicitation

A1.06 Propulsion Health State Assessment and Management

Lead Center: GRC

Participating Center(s): AFRC

The emphasis for this subtopic is on propulsion system health management, in order to predict, prevent, or accommodate safety-significant malfunctions and damage. Past advances in this area have helped improve the reliability and safety of aircraft propulsion systems; however, propulsion system component failures are still a contributing factor in numerous aircraft accidents and incidents. Advances in technology are sought which help to further reduce the occurrence of and/or mitigate the effects of safety-significant propulsion system malfunctions and damage. Specifically the following are sought: propulsion health management technologies such as instrumentation, sensors, health monitoring algorithms, and fault accommodating logic, which will detect, diagnose, prevent, assess, and allow recovery from propulsion system malfunctions, degradation, or damage. Specific technologies of interest include:

- Self-awareness and diagnosis of gas path, combustion, and overall engine state (containment systems and rotating and static components), and fault-tolerant system architectures.
- Analytical and data-driven techniques for diagnosing incipient faults in the presence deterioration, engine-to-engine variation, and transient operating conditions.
- Innovative sensing techniques for the cost-effective assessment of turbomachinery health in harsh high-temperature environments including high temperature sensors including fiber optic and Microsystems, rotatodynamics monitoring, energy harvesting, communication, and packaging.
- Prognostic techniques for the accurate assessment of remaining component life while in-flight.