



NASA SBIR 2008 Phase I Solicitation

A1.10 Detection of In-Flight Aircraft Anomalies

Lead Center: GRC

Participating Center(s): AFRC, ARC, LaRC

Adverse events that occur in aircraft can lead to potentially serious consequences if they go undetected. This effort is to develop the technologies, tools, and techniques to detect anomalies from adverse events in hardware, software, and the interactions between these two classes of systems. This involves the integration of novel sensor technologies for structures, propulsion systems, and other subsystems within the aircraft and/or the development of novel methods to detect failures in software systems. The emphasis of this work is not on diagnosing the exact nature of the failure but on identifying its presence. Proposals are solicited that address aspects of the following topics:

- Analytical and data-driven technologies required to interpret the sensor data to enable the detection of fault and failure events;
- Methods to detect failures in software systems which have already undergone verification and validation;
- Methods to differentiate sensor failure from actual system or component failure;
- Characterizing, quantifying, and interpreting multi-sensor outputs;
- Integration of propulsion, airframe, and software health information for improved vehicle state-awareness;
- New sensors and sensory materials that operate in harsh environments; and
- New methods to provide better and more accurate information to diagnostic computational algorithms that reconstruct damage fields from sensor values.

Emphasis is on novel methods to detect failures in electrical, electromechanical, electronic, structural, propulsion, and software systems. Where possible, a rigorous mathematical framework should be employed to ensure the detection rates and detection time constants are acceptable according to published baselines as characterized by statistical measures. Understanding and addressing validation issues are critical components of this effort.

