NASA SBIR 2012 Phase I Solicitation

A3.09 Ground and Flight Test Techniques and Measurement Technologies

Lead Center: AFRC

NASA is committed to effective support and execution of flight research. This includes developing test techniques that improve the control of in-flight test conditions, expanding measurement and analysis methodologies, and improving test data acquisition and management with sensors and systems that have fast response, low volume, minimal intrusion, and high accuracy and reliability. By using state-of-the-art flight test techniques along with novel measurement and data acquisition technologies, NASA will be able to conduct flight research more effectively and also meet the challenges presented by NASA's cutting edge research and development programs. NASA's Aeronautical Test Program (ATP) supports a variety of flight regimes and vehicle types ranging from civil transports, low-speed, to high-altitude long-endurance to supersonic and access-to-space. Therefore, this solicitation can cover a wide range of flight conditions and craft.

NASA also requires improved measurement and analysis techniques for acquisition of real-time, in-flight data used to determine aerodynamic, structural, flight control, and propulsion system performance characteristics. These data will also be used to provide test conductors the information to safely expand the flight and test envelopes of aerospace vehicles and components. This requirement includes the development of sensors to enhance the monitoring of test aircraft safety and atmospheric conditions during flight testing.

Flight research and test capability proposals should be relevant to the following NASA aeronautical test facilities: Western Aeronautical Test Range, Aero-Structures Flight Loads Laboratory, Flight Research Simulation Laboratory, and Research Test Bed Aircraft. Proposals should address innovative methods and technologies to extend the health, maintainability and test capabilities of these flight research support facilities. Areas of interest include:

- Multi-disciplinary nonlinear dynamic systems prediction, modeling, identification, simulation, and control of aerospace vehicles.
- Test techniques for conducting in-flight boundary layer flow visualization, shock wave propagation, Schlieren photography, near and far-field sonic boom determination, atmospheric modeling.
- Active flow control techniques for performance and acoustic noise reduction.
- Intelligent health monitoring for hybrid or all electric distributed propulsion systems.
- Methods for significantly extending the life of electric aircraft propulsion energy sources (e.g., batteries).
• Innovative acoustic noise reduction technology for structural and propulsion systems.

• Techniques for manufacturing lighter, thinner, and tougher engine fan blades than current state-of-the-art.

• Measurement technologies for steady & unsteady aerodynamic, aero-thermal dynamics, structural dynamics, stability & control, and propulsion system performance.

• Verification & Validation (V&V) of complex highly integrated flight systems including hardware-in-the-loop testing.

• Innovative techniques that enable safer operations of aircraft (e.g., non-destructive examination of composites through ultrasonic techniques).