NASA SBIR 2007 Phase I Solicitation

A4.02 Test Techniques and Facility Development

Lead Center: GRC

Participating Center(s): AFRC, ARC, LaRC

NASA is concerned with operating its flight test aircraft with new and innovative flight test measurement methods. By using state-of-the-art test measurement technologies and novel means of acquiring test data, NASA will be able to operate its flight test aircraft and test-beds more effectively and also meet the challenges presented by NASA’s cutting edge research and development programs. NASA's missions and programs push the limits of technology which places greater demands on its flight test-beds. These flight test-beds are often used in conjunction with ground test facilities to confirm theory and provide verification and validation of new technologies. Therefore, NASA is seeking highly innovative and commercially viable test measurement technologies that would increase efficiency or overcome test limitations for flight research.

Flight test vehicles operate over a wide range of environmental conditions including among others: variable ambient pressure (the result of altitude changes), variable temperature (the result of altitude and airspeed changes), and vibration and acceleration (the result of engine vibration and dynamic flight maneuvers). In addition, weight, volume, and power requirements are at a premium because of limited space, power, and weight carrying capacity.

The first emphasis for this subtopic is in the area of flight test techniques. Factors in flight test techniques include, but are not limited to: methods for achieving accurate and repeatable flight test conditions (e.g., altitude, airspeed, flow quality, or turbulence intensity). Reconfigurable systems, alternative power sources, and novel methods for onboard data processing, storage, real-time access and RF data transmission are of interest. Technologies are also being requested to aid in multi-aircraft co-operative test techniques to enable chase aircraft to probe flow fields and visualize shock patterns around target aircraft.

The second emphasis for this subtopic is in the area of flight test measurement technology. Examples of the types of technology solutions sought are: data acquisition system improvements and miniaturization, skin friction experimental measurement techniques, and improved flow transition measurement techniques. Special emphasis
is placed on new or novel, non-intrusive measurement technologies for pressure, temperature, and force measurements, and force measurement (balance) technology. Also, techniques that could facilitate shortening test measurement installation and setup times would be of interest such as methodologies that minimize the wiring infrastructure and other aircraft installation requirements would be applicable. Another area of interest is in test data conversions to different domains or data compression to reduce the volume of information that must be transmitted over existing telemetry links. It should be understood that all of these technologies must be capable of operating under extremes of temperature, pressure, and vibration typical in the flight environment.

Proposals that lead to products or processes that are applicable specifically to the ATP facilities and across multiple flight test-beds are especially important. Test-beds can be broadly categorized throughout a range of flight regimes encompassing hypersonic (e.g., orbital, sub-orbital, Phoenix missile), supersonic (e.g., F-15, F-16, F-18), and subsonic Fixed-Wing aircraft (e.g., ER2, G3, Predator-B). All platforms have a variety of different Mach/Altitude flight envelopes.