



## **NASA SBIR 2011 Phase I Solicitation**

### **A1.10 Advanced Dynamic Testing Capability for Abnormal Flight Conditions**

**Lead Center: LaRC**

The goal of developing a comprehensive methodology for obtaining appropriate aerodynamic math models for flight vehicles over a greatly expanded flight envelope requires a more general formulation of the aerodynamic model that more accurately characterizes nonlinear steady and unsteady aerodynamics. This leads to greater demands in the development of dynamic test techniques and correspondingly more demands on test facility capabilities. This topic is for the design and software for a prototype dynamic test rig for wind or water tunnel application, with guidance for scaling up to large facilities. The concept should be aimed at providing high-automation and productivity for arbitrary, programmable, multi-axis motions, and should consider the following test capabilities that are considered an important subset of possible motions for characterizing vehicle dynamics characteristics under abnormal flight conditions: conventional single-axis forced oscillation; constant-rate motion through the use of square and triangle waveforms; steady and oscillatory coning motions; inclined axis coning; coupled, multi-axis motion; and wide-band inputs, such as Schroeder sweeps. Design should include considerations for mitigating blockage and interference effects.