



NASA SBIR 2011 Phase I Solicitation

A1.15 Unmanned Vehicle Design for Loss-of-Control Flight Research

Lead Center: LaRC

Participating Center(s): AFRC

Recent advances in unmanned vehicle systems have enabled subscale flight testing using remotely piloted or autonomous vehicles to obtain high fidelity estimates of key aircraft performance parameters. An important requirement for obtaining relevant dynamic flight data from subscale vehicles is to apply dynamic scaling to the aircraft, so as to provide scaled inertial and mass properties, as well as geometric similitude.

The use of these vehicles is of particular interest in aviation safety studies because they allow exploration into unusual flight attitudes and upset conditions that are difficult to test in full scale aircraft due to structural limits and other safety concerns. Models of the stall and departure characteristics, as can be identified through flight testing, are needed to improve both aircraft training simulators as well as allow the design of control systems to reduce loss-of-control accidents.

Proposals are sought for a subscale civil transport vehicle design for remotely operated flight testing that allows a wide range of vehicle configurations. The vehicle should be modular in construction to emulate configurations representative of both conventional tail jet transports with under-wing engines and T-tail transports with rear mounted engines. In addition, the design should allow ballasting to achieve a range of target inertias and center of gravity locations. The ability to introduce flexible components for aeroelastic effects, as well components to model structural and control surface failures are also of interest.

Proposals should address construction methods that allow tradeoffs in costs and complexity while maintaining structural integrity required for loss-of-control flight testing. Control surfaces should be distributed to provide redundancy and allow for experiments involving actuator failures and in-flight dynamic simulation. Vehicle size should be consistent with commercially available turbine engines and allow road transport with manual field assembly.

