



## NASA SBIR 2016 Phase I Solicitation

### A1.06 Vertical Lift - VL Measurement Techniques and Condition-Based Maintenance

Lead Center: ARC

Participating Center(s): GRC, LaRC

The Vertical Lift subtopic is primarily interested in the following two areas:

- Health management of drive systems for vertical lift vehicle is critical to reliable operations and safety. Predictive Condition-Based Maintenance (CBM) improves safety, decreases maintenance costs, and increases system availability. A topic of interest in CBM includes analysis capabilities and models to simulate operating drive systems and components, including the modeling of realistic anomalies and faults that can help design and qualify CBM systems, and test their utility in making maintenance decisions. These CBM simulation capabilities should be of sufficient fidelity, demonstrated by validation and verification performance metrics, to allow development of CBM systems that include: differentiation between different failure modes, detection of onset and progression of failures, identification of the damaged component, assessment of damage severity, measurement of usage to predict remaining life, and recommendation of maintenance actions required. Proposals based only on novel post-processing of accelerometer data will not be considered for award.
- Accurate measurements of lift systems and blade aerodynamics are key to developing and validating high-fidelity analyses and designing next-generation high-performance vertical lift systems. A topic of interest is instrumentation and measurement techniques for assessing blade boundary layer state (e.g., laminar flow, transition, turbulent flow) of a rotating blade system in hover and forward flight conditions. IR thermography is one technique for identifying transition but the technique typically requires heating (or cooling) the blade to enhance temperature differentials between the blade and the ambient air. Techniques, IR or non-IR, are sought that are non-intrusive or minimally non-intrusive. Both on-surface and off-surface techniques that can be efficiently applied to new or existing blades for testing in a wind tunnel or in flight are desired.

Proposals on other vertical lift technologies will also be considered however the primary emphasis of this solicitation will be on the above two identified technical areas.