



NASA SBIR 2017 Phase I Solicitation

A1.06 Vertical Lift Technology

Lead Center: GRC

Participating Center(s): ARC, LaRC

Technology Area: TA15 Aeronautics

The Vertical Lift subtopic is primarily interested in innovative technologies to improve reliability and performance and reduce environmental impact of small-scale, autonomous, vertical lift UAVs.

The use of small UAVs for commercial operations is rapidly increasing, and the rapid pace of technology advancements in electric and hybrid-electric power and autonomy systems expands the range of commercial missions that these vehicles are performing. With increased vehicle use there will be challenges self-monitoring performance and health status to efficiently maintain these vehicles, while detecting faults and degradations before they impact mission performance or cause the loss of the vehicle or payload. In addition, there will be trade-offs in vehicle operation between maximizing mission and propulsion system performance, while minimizing the environmental impact and annoyance from noise. These trade-offs will have to be taken into account within the vehicle health management system for mission planning and execution, given that the trade-offs may be different for different parts of a mission.

Areas of interest include:

- Development and demonstration of all-electric and/or hybrid-electric technologies for vertical lift UAV propulsion systems, including validated modeling and analysis tools and prototype demonstrations, that show benefits in-terms of weight, efficiency, low noise, emissions and fuel consumption and include:
 - Development and demonstration of reconfigurable power and energy management system technologies that can maintain performance, noise and efficiency based on vehicle mission, operating environment and system status.
 - Development and demonstration of design tools integrated with on-board health-state awareness and regime recognition technologies that can predict the system life cycle and degradation over the dynamic operational life of the vehicle.
 - Development and demonstration of integrated flight/propulsion control and energy management systems that can maintain optimal power efficiency while adapting to changes in mission from the on-board intelligent health-state awareness and regime recognition technologies.

Proposals on other rotorcraft technologies will also be considered but the primary emphasis of the solicitation will be on the above identified technical areas.