NASA SBIR 2011 Phase I Solicitation

A2.03 Aero-Acoustics

Lead Center: LaRC

Participating Center(s): ARC, GRC

Innovative technologies and methods are necessary for the design and development of efficient, environmentally acceptable airplanes, and advanced aerospace vehicles. In support of the Fundamental Aeronautics Program, improvements in noise prediction, measurement methods and control are needed for subsonic and supersonic vehicles, including fan, jet, turbomachinery, engine core, open rotor, propeller and airframe noise sources. In addition, improvements in prediction and control of noise transmitted through aerospace vehicle structures are needed to reduce noise impact on passengers and crew. Innovations in the following specific areas are solicited:

- Fundamental and applied computational fluid dynamics techniques for aeroacoustic analysis, which can be adapted for design codes.
- Prediction of aerodynamic noise sources including those from engine and airframe as well as sources, which arise from significant interactions between airframe and propulsion systems.
- Efficient prediction tools for turbine and combustor aeroacoustics.
- Efficient high-fidelity computational fluid dynamics tools for assessing aeroacoustic performance of installed high and low speed single- and counter-rotation propellers.
- Innovative source identification techniques for engine (e.g., fan, jet, combustor, or turbine noise) and for airframe (e.g., landing gear, high lift systems) noise sources, including turbulence details related to flow-induced noise typical of jets, separated flow regions, vortices, shear layers, etc.
- Concepts for active and passive control of aeroacoustic noise sources for conventional and advanced aircraft configurations, including adaptive flow control technologies, smart structures for nozzles and inlets, advanced acoustic liners, and noise control technology and methods that are enabled by advanced aircraft configurations, including integrated airframe-propulsion control methodologies.
- Prediction of near field sound propagation including interaction between noise sources and the airframe and its flow field and far field sound propagation (including sonic booms) from the aircraft through a complex atmosphere to the ground.
- Computational and analytical structural acoustics prediction techniques for aircraft and advanced aerospace vehicle interior noise, particularly for use early in the airframe design process;

- Technologies and techniques for active and passive interior noise control for aircraft and advanced aerospace vehicle structures. Prediction and control of high-amplitude aeroacoustic loads on advanced aerospace structures and the resulting dynamic response and fatigue.

- Development of synthesis and auditory display technologies for subjective assessments of aircraft community and interior noise, including sonic boom.