



NASA SBIR 2009 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, propfan, 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, crew and launch vehicle payloads. 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 and sources which arise from significant interactions between airframe and propulsion systems;
- Prediction of sound propagation (including sonic booms) from the aircraft through a complex atmosphere to the ground. This should include interaction between noise sources and the airframe and its flowfield;
- Computational and analytical structural acoustics prediction techniques for aircraft and advanced aerospace vehicle interior noise, particularly for use early in the airframe design process;
- Prediction and control of high-amplitude aeroacoustic loads on advanced aerospace structures and the resulting dynamic response and fatigue;
- 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, and noise control technology and methods that are enabled by advanced aircraft configurations, including integrated airframe-propulsion control methodologies;

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- Technologies and techniques for active and passive interior noise control for aircraft and advanced aerospace vehicle structures;
 - Development of synthesis and auditory display technologies for subjective assessments of aircraft community and interior noise, including sonic boom.