NASA SBIR 2005 Phase I Solicitation

A2.04 Aircraft Systems Noise Prediction and Reduction

Lead Center: LaRC

Innovative technologies and methods are necessary for the design and development of efficient, environmentally acceptable airplanes, rotorcraft, and advanced aerospace vehicles. In support of the goal of the Quiet Aircraft Technology Project for reduced noise impact on community residents, improvements in noise prediction and control are needed for jet, propeller, rotor, fan, turbomachinery, 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 aircraft passengers and crew and on launch vehicle payloads. Innovations in the following specific areas are solicited:

- Fundamental and applied computational fluid-dynamics techniques for aero acoustic analysis, which can be adapted for design codes;
- Simulation and prediction of aero acoustic noise sources particularly for airframe noise sources and situations with significant interactions between airframe and propulsion systems;
- Concepts for active and passive control of aero acoustic noise sources for conventional and advanced aircraft configurations;
- Innovative active and passive acoustic treatment concepts for engine nacelle liners and concepts for high-intensity acoustic sources, which can be used to characterize engine nacelle liner materials;
- Reduction technologies and prediction methods for rotorcraft and advanced propeller aerodynamic noise;
- Development of synthesis and auditory display technologies for subjective assessments of aircraft community and interior noise;
- Development and application of flight procedures for reducing community noise impact of rotorcraft and subsonic and future supersonic commercial aircraft while maintaining safety, capacity, and fuel efficiency;
- Computational and analytical structural acoustics techniques for aircraft and advanced aerospace vehicle interior noise prediction, 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; and
- Prediction and control of high-amplitude aero acoustic loads on advanced aerospace structures and the
resulting dynamic response and fatigue.