



## **NASA SBIR 2008 Phase I Solicitation**

### **A1.12 Mitigation of Aircraft Structural Damage**

Lead Center: LaRC

Participating Center(s): AFRC, ARC, GRC

This topic is jointly supported by the Integrated Vehicle Health Management (IVHM) project and the Aircraft Aging and Durability (AAD) project.

#### **Healing Material System Concepts for IVHM/AAD**

The development of integrated multifunctional self-sensing, self-repairing structures will enable the next generation of light-weight, reliable and damage-tolerant aerospace vehicle designs. Prototype multifunctional composite and/or metallic structures are sought to meet these needs, as are concepts for their analytical and experimental interrogation. Specifically, structural and material concepts are sought to enable in situ monitoring and repair of service damage (e.g., cracks, delaminations) to improve structural durability and enhance safe operation of aerospace structural systems. Emphasis is placed on the development of new materials and systems for the mitigation of structural damage and/or new concepts for activation of healing mechanisms using new or existing materials. These advanced structural and material concepts must be robust, consider all known damage modes for specific material systems, and be validated through experiment.

Similarly, the mitigation and management of aging and other durability-related hazards in future civilian and military aircraft will require the development of advanced materials, concepts, and techniques. NASA is engaged in the research of materials (metals, ceramics, and composites) and characterization/validation test techniques for mitigation of aging and durability issues and to enable advanced material suitability and concepts. Innovations are sought for in these mitigation technologies: concepts for autonomous self-healing of composite aerospace structures. Passive approaches are sought where sensors or external energy are not required to activate the healing process. Desired performance objectives include improved compression-after-impact performance and retarded/arrested damage growth. To be competitive with lightweight traditional (non-healing) aerospace structures, self-healing concepts must not introduce extensive passive weight, such as a reservoir tank of resin, etc.

