NASA SBIR 2012 Phase I Solicitation

H5.01 Expandable/Deployable Structures

Lead Center: LaRC

Participating Center(s): JSC

The SBIR subtopic area of Lightweight Expandable/Deployable Structures solicits innovative concepts to support the development of primary pressurized inflatable modules or large solar array structures for space exploration environments. Concepts should illustrate simple designs, low launch-to-deployed dimension ratios, efficient packaging and deployment techniques. Robustness, damage tolerance, and minor repair capabilities should also be considered in concept submittals. Development of advanced analysis and test methods that verify the performance of highly loaded inflated structures or large solar array systems are highly desired.

Of particular interest for expandable/inflatable systems are high-tenacity fibrous materials for the restraint layer of inflatable structures. Proposed materials should have well-characterized long-term creep behavior or a characterization plan for determination thereof. Also of significant interest are bladder materials with an air permeation rate no greater than 1.5 cc/100 in$^2$/day/atm that remain sufficiently flexible at -50 °F to be deployed on orbit without external heating. Permeation rate should show no increase upon fold/flex testing at -50 °F.

For large solar arrays systems, mass-efficient solar array designs with a scalable path from 20-30 kW up to 300 kW and beyond are needed. Advanced analysis and test techniques to ensure reliable deployment of large solar array structures are of special interest. Novel design and packaging concepts, analysis techniques, and both ground and in-space test methods are sought for large deployable solar arrays as well as for individual components such as lightweight booms, ribs, or frames; flexible substrate materials; and mechanisms.

Technology Readiness Levels (TRL) of 3 to 4 or higher are sought.

Potential NASA Customers include:

- International Space Station.
- Advanced Exploration Systems - Deep Space Habitat.
- Office of Chief Technology - Game Changing Technology Division, and Technology Demonstration Missions.