



NASA SBIR 2009 Phase I Solicitation

X4.02 Expandable Structures

Lead Center: LaRC

Participating Center(s): JSC, MSFC

This subtopic solicits innovative structural concepts that support the development of lightweight structures technologies that could be applicable to lunar surface system habitats. The targeted innovative lightweight structures are for primary pressurized volumes and secondary structures that must be deployed during or after expansion of the primary volume such as the floor and work surfaces. Innovations in technology are needed to minimize launch mass, size and costs, while increasing operational volume and maintaining the required structural performance for loads and environments.

Of particular interest are inflatable structures which are considered to be viable solutions for increasing the volume in habitats, airlocks, and potentially other crewed vessels. However, areas of risk need to be mitigated to build confidence in the use of these structures, in particular: consistent and reproducible mechanical behavior, durability in the presence of micrometeoroid impact, crew-induced and ground handling damage, and repair techniques for long term survivability. Other interests include preintegration solutions, launching pressurized volume in an expandable, and addressing lunar surface deployment concerns.

Also of interest are innovative deployable secondary structures that have minimal mass and high packaging efficiency. These secondary multi-functional structures provide highly robust, stiff and mass efficient surfaces that enable the useful outfitting and pre-integration of subsystems within the primary structural volume.

Development of concepts can include structural components, methods of validation, and/or predictive analysis capabilities. Technological improvements that focus on risk reduction/mitigation, and development of reliable yet robust designs are also being sought under this announcement. Research should be conducted to demonstrate technical feasibility during Phase 1 and show a path toward a Phase 2 hardware demonstration, and when possible, deliver a demonstration unit for functional and environmental testing at the completion of the Phase 2 contract.

