X6.02 Lightweight Pressurized Structures Including Inflatable

Lead Center: LaRC

Participating Center(s): GRC, JPL, MSFC

This subtopic solicits innovative structural concepts that support the development of lightweight structures technologies that could be applicable to CEV, CLV and Lunar surface landers and habitats. The targeted innovative lightweight structures are for primary pressurized structures such as cryotanks and crewed vehicles (landers and habitats). Innovations in technology are needed to minimize launch mass and costs, and increase operational volume for minimal launch volumes while at the same time maintain required structural performance for loads and environments. Of particular interest are the following structural concepts:

- Cryotank structural systems that are low mass and minimize cryogen boil-off. These concepts can include new techniques in structural concepts, manufacturing, and incorporation of tank liners or innovative insulating materials that improve on SOA designs used today.
- Lightweight multifunctional structural systems that include radiation shielding, impact shielding, thermal management, damage tolerance and durability, and/or integral diagnostics/health monitoring capabilities are of interest if they can be developed to improve the efficiency (mass/performance) of the structural system over the parasitic systems used today.
- Inflatable structures are considered as viable technique to improve volume for crew in habitats and potentially other crewed vessels. However, areas of risk need to be mitigated to build confidence in the use of these structures. In particular, durability in the presence of micrometeoroid, orbital debris and crew load induced damage, radiation-shielding protection, equipment placement and tie down concepts, and efficient packaging concepts are of interest.

Development of concepts can include structural components, improved low cost manufacturing processes, 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.