NASA SBIR/STTR Technologies

Integrated Inflatable Ballute for Planetary Entry

CFD Research Corporation, Huntsville, AL

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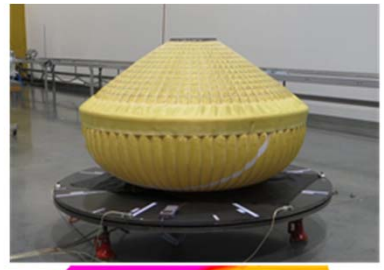
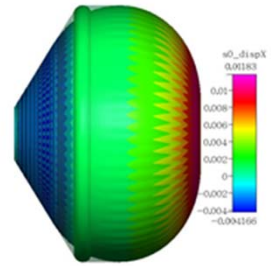
Contract No.: NNX11CA28C

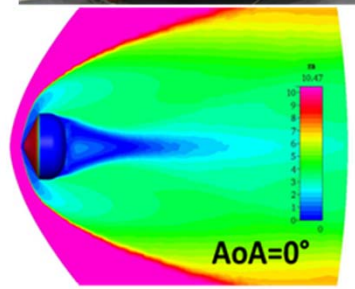
Identification and Significance of Innovation

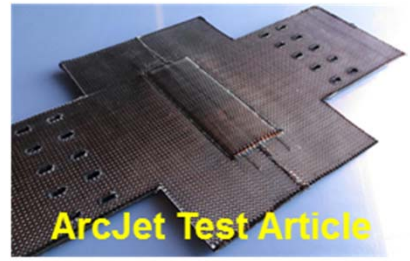
- Inflatable structures have emerged as a promising enabling technology for future planetary exploration to provide a lighter weight design than a rigid structure of the same size and drag coefficient due to the inherent rigidity of a pressurized vessel.
- NASA is investigating the development of flexible carbon fabrics for deployable aeroshells used in EDL. The carbon fabric and the joints between fabric panels need to withstand the harsh aerothermodynamic loading environments imparted by high speed entries into planetary atmospheres.
- The proposed model is a hybrid mass-optimized pressure restraint inflatable structure, utilizing unique UHPV technology.
- UHPV technology permits manufacture of robust inflatable pressure vessels with unprecedented accuracy and dimensional stability. Its performance has been mathematically verified and validated.

Expected TRL Range at the end of Contract (1-9): 5-6









Technical Objectives and Work Plan

The main objective of the Phase II enhancement effort is to mature the IAD technology for planetary entry. The objective will be achieved through the following work plan; 1) Extended performance analysis of the IAD model under typical non-symmetric loading conditions and conducting parametric study on the inflation pressure; 2) Development of a single body sphere cone IAD based on the UHPV technology; and 3) Demonstration of carbon stitching technology for the ADEPT program.

NASA and Non-NASA Applications

- Direct NASA applications with present and future inflatable structures programs, such as those seeking to provide deceleration and precision landing capability for large scale mass return from Earth orbit to Earth surface, or for missions to many of the potential atmosphere-endowed solar system destinations
- Other NASA applications include analysis of space-based inflatable structures such as telescopes and mirrors, satellite solar panels, inflatable decoys, lander airbags, and rover vehicles.

Firm Contacts

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NON-PROPRIETARY DATA