Adaptable Deployable Entry and Placement Technology

Problem Statement

- Robotic and human missions are limited by decades-old rigid, high ballistic coefficient aeroshells
- sRLV provides a low-cost approach to demonstrating exo-atmospheric deployment and aerostability of low ballistic coefficient, mechanically deployed open-back entry system concept
- Potential users include GSFC, JPL, APL. In addition, secondary payload developers for Cube-Sat and Small-Sat class missions requiring entry.

Technology Development Team

- Alan Cassell, Project Systems Engineer, Brandon P. Smith, Project Scientist, NASA Ames Research Center.
- Funding sponsor- Game Changing Development Program, STMD.
- Technology Partners: GSFC, Thin Red Line Aerospace, Bally Ribbon Mills, CNAT (GCD technology development project)

Proposed Flight Experiment

Experiment Readiness:

- Hardware planned for delivery in Q1, FY2016.

Test Vehicles:

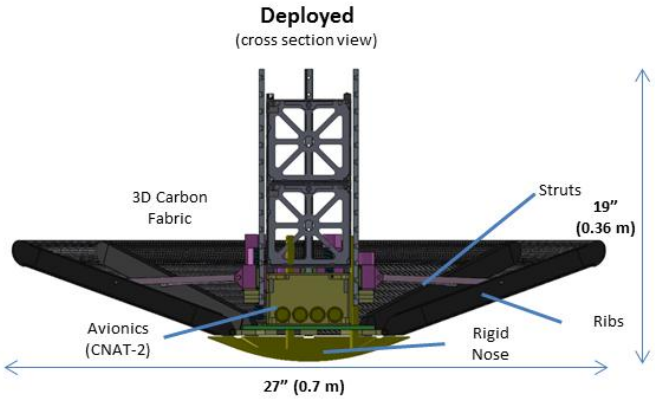
- sRLV (UP Aerospace, SpaceLoft XL)

Test Environment:

- Ejection of ADEPT at or near 115 km altitude followed by exo-atmospheric deployment will enable ADEPT to re-enter and achieve >Mach 3 decelerating to ~20 m/sec prior to impact.

Test Apparatus Description:

- ADEPT cross-sectional view showing key features and avionics unit.



Technology Maturation

- Overall ADEPT 1 m class development approach leverages system level testing to demonstrate performance at flight relevant scale and environments with minimal material/component level characterization
- Upon successful completion of sRLV flight test and full-scale arc-jet tests enable ADEPT to achieve TRL=5/6 for a Mars Design Reference Mission by mid FY 2016.

Objective of Proposed Experiment

- Demonstrate LV separation and exo-atmospheric deployment. Characterize aerodynamic performance and stability below Mach 3.
  - Record 6-DOF data (lat, long, altitude, roll, pitch and yaw) and obtain aeroshell pressure and load measurements.
  - Data will be used to validate trajectory computed by free-flight CFD code.

Technology Areas addressed: Taken from Entry, Descent & Landing Roadmap: TA09-9 Flexible TPS, TA09-11 Deployable Aeroshells, TA09-12 Entry Modeling and Simulation

8/2014