H9.03-6592 - Self-Assembling Space Structures

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NASA

NON-PROPRIETARY DATA

IDENTIFICATION AND SIGNIFICANCE OF INNOVATION

Self-Assembling Space Structures made from carbon composite can navigate, rendezvous and dock from a large swarm of autonomous panels, using low-cost components, allowing the assembly in zero gravity of spheres, domes, cylinders or discs of enormous size (60 m or larger) but made from panels that can be launched in a single 5m diameter rocket fairing. The structures can be used in space or landed, intact, on the Moon or Mars.

TECHNICAL OBJECTIVES AND WORK PLAN

The Phase I objectives are:

Build and test a carbon composite panel that can autonomously self-assemble into a large structure in zero gravity.

- Demonstrate navigation and positioning of a sub-scale model in 2D on an air table.
- Demonstrate locking and unlocking of side joints.
- Test leak rate through joined panels.

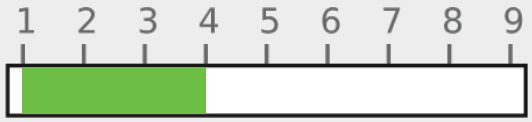
The work will be accomplished by constructing a sub-scale panel and cold-gas RCS pods using off-the-shelf commercial components including digital wireless network range-finding cards, digital cameras, wax motors, piloting solenoid valves, and a control computer with a web-based wireless (WiFi) graphical user interface.

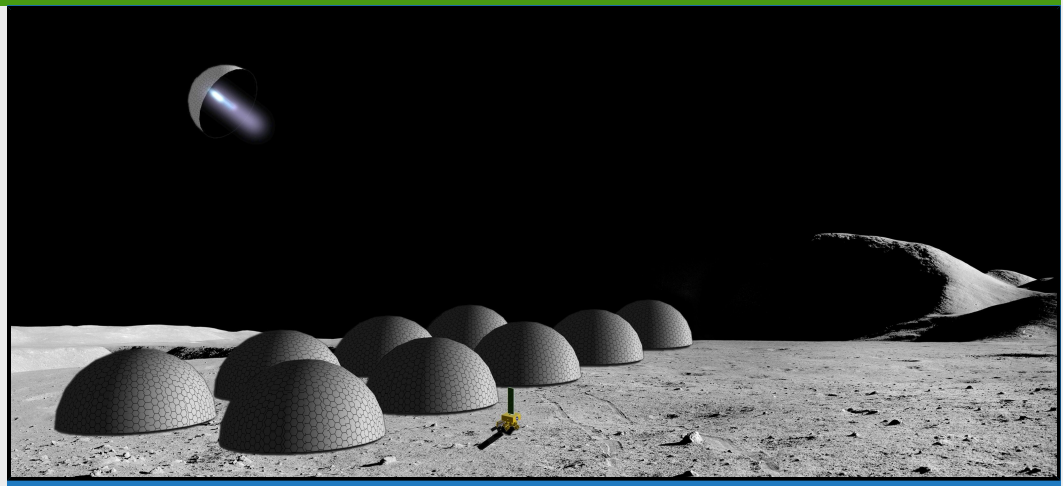
Proposed Deliverables:

- Design drawings and software source code
- Video and Photos of Testing
- Live Demonstration for NASA in Austin TX
- Final Report

TRL

Estimated





NASA APPLICATIONS

- large dish antennas, sunshades, radiators
- hexagonal array solar panels for SEP
- geodesic dome shelters for Moon or Mars
- large aeroshells for Mars landing or orbital insertion

NON-NASA APPLICATIONS

- spherical asteroid enclosures for volatiles mining
- hexagonal solar arrays for SEP, electrolysis of fuel
- orbiting centrifuge for metal refining

Money will be made from:

- software licenses
- finished structures
- or by operating in-space energy services

FIRM CONTACTS

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