



Reduced Gravity Flight Demo of SPHERES INSPECT

Problem Statement

- Test a sensor/actuator suite to facilitate NASA HEOMD mission need for free-flying autonomous systems for extravehicular inspection and characterization.
- Parabolic flights will help to finalize the design, reduce risk on specific control areas, and reduce crew time required for system ID.
- Users: NASA, DoD, NRO, ESA – Any entity utilizing autonomous extravehicular systems

Technology Development Team

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Proposed Flight Experiment

Experiment Readiness:

- Hardware is currently being manufactured
- It will be ready for testing by May, 2014

Test Vehicles:

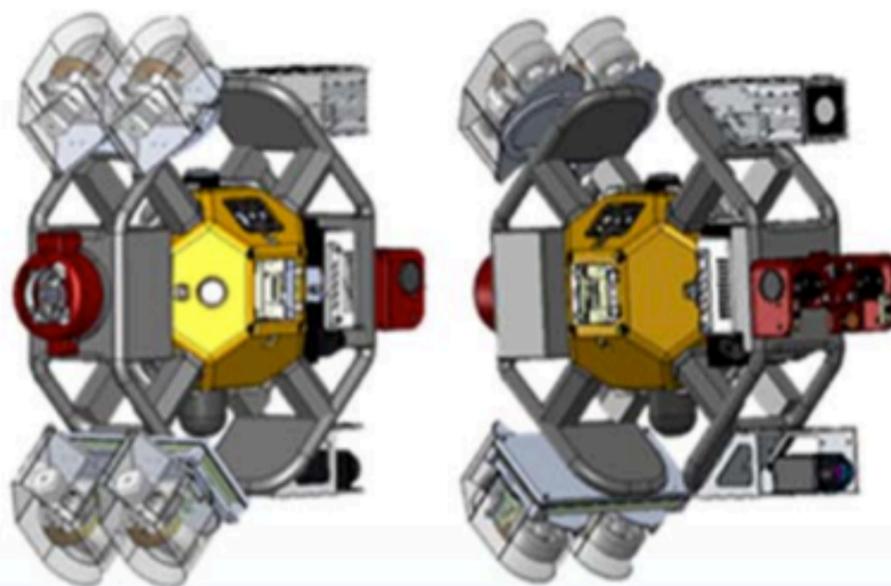
- Parabolic Aircraft – Two flight weeks

Test Environment:

- The relevant environment is microgravity to support the testing and verification of sensors and actuators to be used as part of a future free-flying satellite inspection system inside the ISS.

Test Apparatus Description:

- Two scissored pair CMGs, an optical rangefinder, a thermographic camera, and the VERTIGO Goggles will be added to a Halo structure around a SPHERES satellite.



Technology Maturation

- Currently TRL 4
- TRL 5 – Parabolic Flight
 - Spring 2014 Desired
 - Preliminary dynamics and control law verification
- TRL 6 – Operations on ISS
 - Launch late 2014
 - Extensive dynamics, control, and navigation development testing and test program
- Should reach TRL 6 by mid 2015

Objective of Proposed Experiment

- Objectives:
 - System ID, Torque model verification, preliminary control law stability verification, vision system data integration in 6DOF, plume impingement checks
- Expected Flight Data:
 - Global and inertial metrology data to compare system response to vision sensors as compared to models and simulation