Dragon V2 Propellant Management Device Microgravity Validation

Problem Statement

- Managing propellants in orbital microgravity environments requires advanced technologies which are difficult to validate with ground based testing alone.
- Parabolic flight testing will allow SpaceX to validate the new design of the propellant management device (PMD) for the Dragon V2 spacecraft.
- Dragon V2 will be used to transport both NASA astronauts and cargo to and from the ISS and for commercial astronauts and scientific missions.

Technology Development Team

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Proposed Flight Experiment

Experiment Readiness:

- The technology this proposal is testing is currently at Technology Readiness Level 5. After parabolic testing it will be at level 7.

Test Vehicles:

- Parabolic aircraft.

Test Environment:

- The payload will benefit from microgravity testing, specifically near zero gravity. The experiment may be free floated to achieve the minimum possible acceleration.

Test Apparatus Description:

- The payload will consist of a subassembly of SpaceX's flight version of the propellant management device. A system of electronics and plumbing components will pressurize and control flow through the system and capture video during the test.

Technology Maturation

- Validation of the system through microgravity testing consisting of effective PMD performance will bring technology to TRL level 7.
- During summer of 2014 the tech will be advanced to TRL level 6 and once parabolic testing is complete it will reach TRL level 7.
- The first Dragon V2 orbital test flight to fully test the tech will be in the next few years.

Objective of Proposed Experiment

- Validate the technology's design and novel fabrication process.
- Video footage of the gas/liquid interface inside the payload will serve to validate the design and anchor the analysis.

This project fits under multiple sections of OCT Technology Area 01, In-Space Propulsion.

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