Caging System for Drag-free Satellites

T0063-P

Problem Statement

- Design of caging mechanism (launch lock) for drag-free test mass
- Demonstrate un-caging and re-caging of drag-free test mass in zero-g environment
- Applications for drag-free technology include Geodesy, Aeronomy, Fundamental Physics.
- Potential users are NASA's Earth Sciences Division, the Earth Science Technology Office, and Physics of the Cosmos program

Technology Development Team

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- Partnership with NASA Ames Research Center for Space Qualification Test (Shake and Bake)

Proposed Flight Experiment

Experiment Readiness:

- February 2013

Test Vehicles:

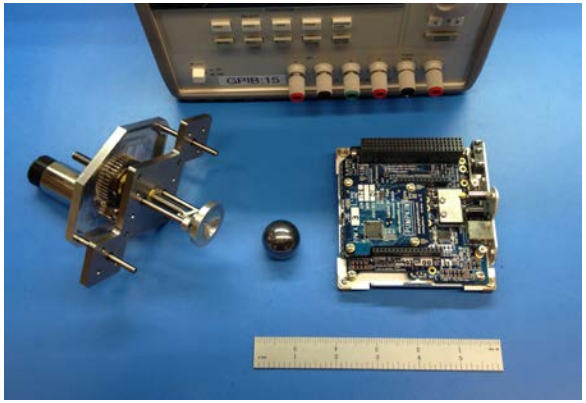
- Parabolic aircraft

Test Environment:

- Near zero gravity

Test Apparatus Description:

- The proposed caging mechanism is part of the Modular Gravitational Reference Sensor (MGRS) for drag-free satellites
- Releases test mass with low residual velocity
- Housing, caging mechanism and test mass for a CubeSat are tested and test mass dynamics during un-caging are studied.



Technology Maturation

- Establish compression load above design threshold, un-cage and re-cage in laboratory environment (TRL4)
- Maintain compression load during Shake and Bake Test, un-cage and re-cage after test and un-cage and re-cage in relevant environment during zero-g flight (TRL6)

Objective of Proposed Experiment

- Demonstrate un-caging and re-caging in zero-g environment
- Record test mass dynamics during un-caging process
- Post-flight analysis of relative residual velocity vector