



Application of controlled vibrations to multiphase systems for space applications

Problem Statement

- The management of multiphase flows in low gravity conditions is a challenge far from being fully understood. Many systems in NASA missions can benefit from a better control of this flows.
- The requested flights support the technology development efforts since they provide long times of good microgravity quality.
- The matured technology can be used in different kind of systems (ECLSS, fuel tanks, etc.)

Technology Development Team

- Principal Investigator: Ricard González-Cinca, Universitat Politècnica de Catalunya-BarcelonaTech (UPC), Spain, ricard.gonzalez@upc.edu
- Co-I: Richard Tyson, University of Alabama in Huntsville.
- Funding support from: UPC and Ministry of Economy and Competitiveness, Spain.

Proposed Flight Experiment

Experiment Readiness:

- The experiment will be ready for its first flight in Nov-Dec 2012

Test Vehicles:

- sRLV

Test Environment:

- A first version of the experiment has previously flown in a mini-Texus-like rocket. The microgravity time provided in that flight was slightly shorter than the requested time in Flight Opportunities.

Test Apparatus Description:

- The experimental setup consists of a test cell containing different gas-liquid mixtures, and systems for vibrations generation, data acquisition, power regulation and control. The experiment is fully automatized.



Technology Maturation

- TRL will be increased after the technology tests with different cell configurations.
- Every cell configuration will be tested in a different flight.
- A high TRL of the matured technology is expected at the end of the series of flights.
- The maturation of the technology can support the ISS experiment *Nucleate boiling in long-term cryogenic propellant storage in microgravity.*

Objective of Proposed Experiment

- The mid-term objective is to gather enough information to determine the system to use in the ISS experiment.
- The final objective is to acquire sufficient knowledge on the proposed technology to be able to use it in different applications.
- The technology development will be advanced by means of the analysis of the videos recorded in the experiment.

The proposed experiment can be applicable to technologies of the following OCT areas: TA02, In-Space Propulsion Technologies; TA06, Human Health, Life Support and Habitation Systems; TA07, Human Exploration Destination Systems; and TA14, Thermal Management Systems.