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Microgravity Experiments from Sub-Orbital to Orbital Platforms (3)

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PRELIMINARY RESULTS FROM HEDGEHOG REXUS PROJECT – SOUNDING ROCKET EXPERIMENT ON ACCELERATIONS, VIBRATIONS AND HEAT FLOW

Abstract

As access to space conditions becomes more available, both technically and economically, scientists' interest in launching finer and more sophisticated experiments grows. This applies now more than ever to fragile by nature biological and chemical experiments. To be qualified for launch, such experiments need to be carefully tested prior to the event. The tests should represent actual launch conditions as closely and in as detailed manner as possible. For this reason, comprehensive measurements of launch conditions are required. Most important acceptance tests required for module acceptance are vibration tests and thermal tests. This experiment focuses on measuring acceleration and vibrations (especially eigenfrequencies) conditions and heat transfer inside a sounding rocket as a reference for future ground acceptance tests. The experiment's scientific challenge is to obtain precise information on acceleration and vibration environment that payload is subject to during whole course of sounding rocket flight. Although an envelope of environmental conditions is known and publicly available, including spectral data their application is usually limited to serving as general guideline due to their lack of details. In case of vibrations, this is usually low frequency range of measurements, as high frequency vibrations tend to be less important for sturdy REXUS experiments. The second scientific objective is to measure temperature in various locations of the section of the sounding rocket. With such data, it would be possible to create the model of heat flux transfer inside the launch vehicle. Obtained results will allow for precise verification of future payload. Previous REXUS experiments typically included single point temperature measurements, focusing on local effects rather than heat transfer phenomena.

Preliminary results from flight that will take place in early March 2019 in Kiruna, Sweden will be presented.