

IAF MICROGRAVITY SCIENCES AND PROCESSES SYMPOSIUM (A2)
Microgravity Experiments from Sub-Orbital to Orbital Platforms (3)

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A DESIGN AND PERFORMANCE EVALUATION OF PASSIVE MICROGRAVITY SENSOR

Abstract

This paper presents a design and performance analysis of the passive microgravity sensor. The passive microgravity sensor is specially designed for non-electric supplied payload which was launched on Mission 9 of New Shepard, Blue Origin. Due to the weightlessness during microgravity, the general mass-spring systems with appropriate mass and spring constant are used to design the sensor and gain the benefit from weightlessness. The movable lid of the passive microgravity sensor can be mechanically opened when the sensor is in microgravity condition, subsequent to which substances in the experiment chamber in the sensor will be released. All flight scenarios, including microgravity and hypergravity condition, were analyzed to design the mechanism. There are two passive microgravity sensors installed into partition 2 and partition 3 of the payload. As a result, the pencil and graph paper recording of each passive microgravity sensors confirms the movement of the movable lid. The movable lid of the passive microgravity sensor in partition 3 moved upward around 11 mm. However, the movable lid of the sensor in partition 2 moved only 5 mm, which relatively lower than the sensor in partition 3. As a consequence of the friction between pencil and paper recorder, it mainly affects the mechanism of the passive microgravity sensor. This caused the passive microgravity sensor in partition 2 behaved differently compared with a sensor in partition 3. These results confirmed the performance of the mechanism of the passive microgravity sensor under the microgravity condition.