

MICROGRAVITY SCIENCES AND PROCESSES SYMPOSIUM (A2)
Microgravity Sciences Onboard the International Space Station and Beyond - Part 1 (6)

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THE USING OF SPRING VIBRATOR ON SMALL MASS MEASUREMENT IN MICRO-GRAVITY
ENVIRONMENT

Abstract

Small mass measurement (0.5kg) in micro-gravity environment is important for the use of room in manned space engineer and space monitoring of astronauts in long-term flight health security. After analyzing the characteristic, method and the difficulty of small mass measurement in micro-gravity environment, based on the vibration principle, a single degree of freedom without damping mass-elastic system which is called spring vibrator technology was designed to achieve the measurement of small mass. This paper applied ANSYS modal analysis to the mass-elastic oscillator system to verify and correct the relationship of spring oscillator harmonic vibration, and make sure the formula of the effective quality is accurate and reliable. Using the Hall Effect and the Matlab experimental data processing technology, the spring oscillator was designed in theoretically and the preliminary structure of the small mass measuring instrument was also completed. The precision of the small mass measuring instrument was tested in the air floating stage which was used to simulate micro-gravity environment, at the same time, the factors to affect the accuracy of small mass measuring instrument was also analyzed to improve the design precision, which was used for reference in theoretically and experiment on the follow-up study.