

EXPERIMENT TITLE:

Microgravity experiments of various mobile systems over small solar system bodies

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SCIENTIFIC OBJECTIVE

Japan has just started the development of Hayabusa-2 spacecraft, a sample return mission from an asteroid. The investigators are promoting the installation of several tiny rovers into Hayabusa-2 mission. The name of the rover payload is MINERVA-II, the pedigreed successor of MINERVA rover in Hayabusa mission.

The primary rover of MINERVA-II is the revival of MINERVA which did not land on the asteroid surface. Thus the adapted mobile system is a sophisticated modification of the one for MINERVA. The mobile systems for other rovers have collected a lot of proposals from the academic people all over Japan. Most of the them are based on the hopping mechanism.

The hopping mobile system in general has some technical advantages for moving over the micro-gravitational surface on the small solar system bodies, which was already used for MINERVA rover in Hayabusa, as an implementation of ingenious research by the primary investigator.

The objective of this microgravity experiments using the parabolic flights in Feb 2012 is to evaluate the proposed mobile systems including the one for the primary rover over the simulated asteroid surface before the final fabrication of the flight models.

TECHNICAL DESCRIPTION OF THE EXPERIMENT

We prepare six robots which have different actuator configurations (That means mobile systems are different in robots). During a parabola, the actuators inside the selected robot have started

to move the robot by an interaction with the simulated asteroid surface. All the motions are recorded by the video cameras.

The video images are analyzed after the flight in order to calculate the moving speed and direction of the robot for evaluating the performance.

APPLICATIONS OF THE RESEARCH

The mobile systems with a good result in the parabolic flights will be used for MINERVA-II rovers which are installed in Hayabusa-2 spacecraft. Hayabusa-2 will deliver these robots to the target asteroid for the surface exploration.