

JAXA developed SLR Reflector Mt.FUJI and Technical Demonstration on HTVX

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In recent years, the use of space has expanded rapidly, resulting in a drastic increase in the number of orbital objects. Active debris removal (ADR) and space situational awareness (SSA) have therefore attracted much attention, and thereby, the importance of grasping the orbital and attitude motion of space debris has been increased. To observe space debris motion from the ground, radar and optical observations are commonly performed. However, those observation methods do not have sufficient resolutions for attitude estimation. Japan Aerospace Exploration Agency (JAXA) is now focusing on satellite laser ranging (SLR) as a means of accurately estimating attitude motion from the ground.

If a space object is equipped with an SLR reflector, its visibility from the ground can be ensured even after it becomes debris. However, because conventional SLR reflectors are expensive, heavy, and large, there are not many space objects with an SLR reflector. Therefore, JAXA has developed a general-purpose SLR reflector, named Mt.FUJI (MultiplierFlector Unit from Jaxa Investigation), with the concept of small size, lightweight, and reasonable price. Three Mt.FUJIs are installed on a new unmanned spacecraft HTV-X for demonstration in orbit. The objectives of the Mt.FUJI mission are:

- to verify in-orbit performance of Mt.FUJI as an SLR reflector
- to evaluate SLR-based attitude estimation technique by using true data (telemetry of HTV-X)

In particular, the latter will enable the world's first quantitative evaluation of the effectiveness of the attitude estimation method by SLR, as it has not been evaluated with true values.

In the workshop, we will explain the detail of the Mt.FUJI mission. SLR is essential to achieve Mt.FUJI mission, and we believe that the results of this mission will provide new insights into space debris, as it will enable us high-accuracy orbit determination and attitude estimation of space debris.