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A GATEWAY SUPPLY MISSION SCENARIO AND FLIGHT PLAN WITH UPGRADED H3 AND
HTV-X

Abstract

The lunar orbital platform Gateway is led to be constructed by NASA in 2020s as the staging point for crewed and robotic lunar exploration. JAXA is studying to participate in the Gateway and MHI is considering how to realize the mission with their own techniques, such as supplying cargos with upgraded HTV-X launched by H3.

Both H3 and HTV-X are currently being developed. H3 is based on the heritage of H-IIA/H-IIB. The maiden flight of H3 will be 2020. H3 intends to be more customer friendly launch vehicle by increasing reliability and launch capability while decreasing its price. On the other hand, HTV-X is an advanced version of H-II Transfer Vehicle (HTV) to increase supply cargo capability and provide an on-orbit demonstration opportunity for future exploration mission, like Gateway. HTV-X has two modules, service module(SM) and pressurized module (PM), and rendezvouses ISS by using SM functions, guidance, navigation and control system and propulsion system, and supplies cargos loaded in PM. For Gateway, HTV-X is studied to be further advanced.

Compared with the injection to ISS's low earth orbit, higher delta-v is needed for the injection to transfer orbit to Gateway. To achieve this mission, MHI and JAXA are considering that PM and SM are launched separately and they dock in the highly elliptical orbit around the earth as one of the examples.

This paper reports the study of mission scenario and upgraded H3 and HTV-X.