

IAF SPACE PROPULSION SYMPOSIUM (C4)
Electric Propulsion (1) (5)

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HAYABUSA2'S RETURN TO EARTH AND A NEW DEPARTURE BY MICROWAVE DISCHARGE
ION ENGINES**Abstract**

JAXA's asteroid explorer Hayabusa2 completed its operation near the asteroid Ryugu, which started in June 2018, and carried out a maneuver away from the asteroid on November 13, 2019. In the outbound operation, the total delta-v performed by its ion propulsion was about 1,015 m/s, the space powered flight time reached 6,515 hours, 24 kg of propellant xenon was consumed, and 42 kg remained. On the return trip, 2,400 hours of operation was carried out in two parts, from December 2019 to February 2020 and from May to August 2020. Trajectory correction maneuver (TCM-0) was carried out with one ion thruster from September 15 to 17, 2020, which was the last operation of the ion engine system, followed by several TCMs by chemical propulsion. The capsule returned to Earth on December 6, 2020. The total delta-v in the round trip was about 1.3 km/s, and the powered flight time was 9,514 hours. After consuming 31 kg of propellant xenon, 35 kg remains, and a rendezvous exploration of the asteroid 1998 KY26 in 2031 has been proposed as an extended mission of Hayabusa2. The Hayabusa2 ion engine has been improved from the Hayabusa installed version to increase the maximum thrust per unit from 8 mN to 10 mN, and the neutralizer, which is a life limiting component of the engine, has also been improved. The improved neutralizer has been subjected to ground durability tests since the summer of 2012 prior to launch. Compared to the required life of 10,000 hours for Hayabusa2, 70,000 hours have passed as of March 2021, and it is still operating without failure and testing is ongoing. In this paper, we will summarize the ion engine operation results in the 6-year round-trip mission, analyze the deterioration over time, and report on the progress of the extended mission.