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GNC FLIGHT RESULTS OF HAYABUSA2 OPERATION FOR MASCOT RELEASE

Abstract

The asteroid explorer Hayabusa2 was launched by Japan Aerospace Exploration Agency (JAXA) on December 3rd, 2014. The main mission of the probe is to sample pieces of asteroid [1], and bring it back to the Earth in order to do more advanced scientific analysis on the ground. After three years' cruising phase, Hayabusa2 finally arrived at the asteroid Ryugu on June 28th, 2018, and a mission operation has been started. Hayabusa2 carries several rovers, and separates them to land on the asteroid surface. One of these rovers is called MASCOT which was developed under the collaboration between DLR (Deutsches Zentrum für Luft- und Raumfahrt) and CNES (Centre national d'études spatiales). This rover was planned to be separated to the asteroid surface, and executes several mission on the asteroid surface. In order to support this mission, the mother ship Hayabusa2 is requested to separate this rover at very low altitude around 50m and after separation to hover around 3 km altitude for realizing the assured communication link with MASCOT. On October 2nd – 5th, 2018, we performed the operation for MASCOT release. In the decent operation, Hayabusa2 was successfully guided to the target point which is specified by the MASCOT team, and the MASCOT was released at 51m altitude which satisfies the altitude criteria

defined between MASCOT team and Harabusa2 operation team. After ascent to altitude 3km, Hayabusa2 started the hovering operation in order to ensure the communication between Hayabusa2 and MASCOT. The spacecraft position was adequately controlled to hover around the target position, and the MASCOT operation after landing was successfully executed. In this paper, we introduce the GNC operation scheme and show the flight results of entire operation for MASCOT release.