ASTRODYNAMICS SYMPOSIUM (C1)
Guidance, Navigation and Control - Part 3 (9)

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RENDEZVOUS TECHNIQUE OF HTV AND EVALUATION OF ON-ORBIT RESULTS

Abstract

The H-II Transfer Vehicle (HTV) "KOUNOTORI" developed by Japan Aerospace Exploration Agency (JAXA) is an automated unmanned cargo transport system to the International Space Station (ISS). The HTV mission is to supply requisite materials according to the international agreement among the ISS partners, and therefore the HTV is required to arrive at the ISS as scheduled. On the other hand, strict safety requirements are applied to the HTV so that even in the case of a catastrophic failure, the HTV can automatically abort the rendezvous flight and escape from the vicinity of the ISS. These apparently-opposing requirements raised a lot of technical challenges in the development process of the HTV Guidance, Navigation and Control (GNC) system. However, they were overcome by well-balanced design of guidance and control logic, navigation system including sensors and safety management functions, such as Fault Detection, Isolation and Recovery (FDIR). The design was verified by various test methods to show the compliance with the requirements. This paper introduces evaluation of the HTV GNC system design as a function that takes a major role of Rendezvous technique, based on the result of the HTV 1st and 2nd flights. Especially, design solution and on-orbit flight data evaluation regarding the requirements are focused to show how these technical difficulties were resolved.