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STEPPED DEVELOPMENT APPROACH TO HTV EVOLVED SPACESHIP

Abstract

2009 is a remarkable year for Japanese space program. H-II transfer vehicle (HTV) is planned to be launched by newly developed H-IIB launch vehicle which is performance augmented version of Japan's primary rocket H-IIA. With the advent of HTV, Japan starts to have capability of attaining logistic support for International Space Station (ISS). In view of growing activities in ISS and global attention to manned lunar exploration mission, MHI has started to generate a concept of spaceship that takes over unique features of HTV such as, having Passive Common Berthing Mechanism(P-CBM) for ISS standard payload rack carriage, autonomous rendezvous and docking capability. In the concept of the spaceship, MHI envisages both the cargo and the crew transfer from ISS that helps global ISS logistics more reliable in the years after US space shuttle retirement. The key to generate such spaceship is to add return function from space to HTV. To prepare return function, authors generate a concept of pressurized reentry capsule. Due to Japanese insularity, vast deserted area suitable for reentry capsule landing can not be prepared. Therefore, land return requires quite high accuracy reentry and landing guidance. In this paper, authors generated strategic scenario to attain safe and pinpoint return to minimized area for touch down, In addition to high accuracy guidance, next generation space return system should be more comfortable than currently operated return capsules. Authors show some analysis results to relief reentry acceleration that is small enough to attain benign environmental condition for crews. Finally, system development scenario is described which adopts stepped creation of multiple versions of the vehicle. At first step of the development, cargo return version is prepared that could attain moderate environmental condition allowable even for crewed mission. Following on the initial version, authors suppose supplemental development to add crew mission capability to the system. By using stepped development approach, both of early operational cargo return flight and secured technology acquisition through actual flights prior to crewed mission are realized