

66th International Astronautical Congress 2015

HUMAN SPACEFLIGHT SYMPOSIUM (B3)
Advanced Systems, Technologies, and Innovations for Human Spaceflight (7)

Author: Mr. Lianghao Bai
Institute of Manned Space System Engineering, CAST, China, blh362350051@sina.com

RESEARCH ON A DEPLOYMENT MECHANISM CAN BE APPLIED IN RENDEZVOUS AND
DOCKING

Abstract

The characteristics of the new generation spacecrafts indicate that the reentry capsule has a fairing. During the reentry stage, the fairing benefits for reducing the ablation degree and protecting the docking mechanism, the rendezvous and docking (R&D) devices, and the reentry capsule structure. Therefore, the reusable functions are likely taken into practice. However, the fairing restricts the deployment of the R&D devices in the fairing zone. Moreover, the positions of the R&D devices of the target spacecraft on orbit are already fixed so that the R&D devices on the new designed chaser spacecraft must be corresponding to it. It comes to be a contradiction between the limitation of the fairing zone and the correspondence of the target and chaser spacecrafts' R&D devices. In this paper, a deployment mechanism applied in rendezvous and docking is developed. During the launch stage, both of the mechanism and the fairing are folded so that the R&D devices can be protected in the fairing zone. During the rendezvous and docking stage, both of the fairing and the mechanism are unfolded so that the R&D devices are deployed to satisfy the correspondence of the target and chaser spacecrafts. During the reentry stage, the mechanism and the fairing are folded again to protect the devices. The composition and principle of the mechanism is introduced and the defects are put forward to optimize the design of the mechanism. Some key problems are analyzed. The conclusions and expectations are made in the end.