

HUMAN SPACE ENDEAVOURS SYMPOSIUM (B3)
Astronauts: Those Who Make It Happen (5)

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STUDY ON THE CONTROL RULES OF X AXIS RELATIVE SPEED OF SPACECRAFT DURING
THE MANUAL CONTROL RENDEZVOUS AND DOCKING

Abstract

Objective To study the relationship between X axis relative speed of chaser spacecraft and the docking time, fuel wastage, spacecraft stability and docking precision during the manual control rendezvous and docking (RVD). **Methods** Two different levels (large or small attitude initialization biases) experiments were designed on a simulated RVD system and twenty male volunteers aged 22-40 participated in the experiments. During the manual controlling, the data of relative position and attitude changing at different axis between the chaser and the target were recorded. At the end of docking, the docking time, result and fuel wastage also were recorded. **Results** The X axis relative speed within different subjects has large diversity during the docking and its stability has a high correlation with the docking time ($r=0.85$, $**P<0.01$). At the end of the docking, too fast X axis relative speed may influence the docking precision. From initialization state to the end, the X axis relative speed of two different level tasks has the same changing trend and the optimum controlling ranges between two tasks have not notable diversity ($P>0.05$). **Conclusion** The stability of the X axis relative speed influences the manipulation performance of manual control RVD. There are optimum controlling ranges of the X axial relative speed at different phases during the manual control RVD, the optimum control speed is about 0.6m/s-0.8m/s in chasing phase, 0.35m/s-0.5m/s in controlling phase, 0.15m/s-0.25m/s in final docking phase.