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Author: Dr. Yan Lang
Beijing Institute of Control Engineering, China Academy of Space Technology, China

SPACE-BASED OPTICAL AUTONOMOUS ORBIT DETERMINATION STRATEGY FOR MARS
ORBIT RENDEZVOUS TARGET

Abstract

Aiming at the problem that the resources of the target to be rendezvous (Mars ascent vehicle or sample) in the Mars sample return mission are limited, and it is impossible to obtain its orbit parameters by orbit determination on the ground, the precision requirements and orbit determination time constraints of the orbital information of the Orbiter to rendezvous target in Mars orbit are analyzed, and the constraints such as the autonomous real-time orbit determination process and observability of the target to be rendezvous by using optical angle only method were discussed, meanwhile, the orbit determination strategy based on the combination of generalized Laplace method and Gooding method was simulated and verified by using the simulated space-based angle measurement data under different orbital heights and observation arc lengths. The simulation results show that the autonomous orbit determination strategy of the orbiter designed in this paper can meet the requirements of Mars autonomous orbit rendezvous mission in terms of real-time, convergence speed, accuracy and reliability.