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Author: Mr. Zhang Di

Shenzhen Aerospace Dongfanghong HIT Satellite Lt, China, dizhanghit@sina.com

Mr. Jie Dong

Beijing Institute of Spacecraft System Engineering, China Academy of Space Technology (CAST), China,
donghn13@163.com

Mr. Li Chun

Shenzhen Aerospace Dongfanghong HIT Satellite Lt, China, lichun_515@163.com

Mr. Rao Wei

Beijing Institute of Spacecraft System Engineering, China Academy of Space Technology (CAST), China,
raowei@cast.cn

A SELF-FLIGHT SOLAR SAIL MICROSATELLITE SYSTEM IN DEEP SPACE

Abstract

For a long time, the deep space exploration mission was characterized by high risk and high cost. With the rapid development of current microsatellite technology, for the advantages such as simple structure, short development cycle and low cost, microsatellite can be used as a supplement to the deep space exploration task carry out the key single-machine and technology validation, and open up low-cost deep space exploration approach. In this paper, based on the main task of "Mars Landing Surveillance and Surround Detection", we design a 10kg microsatellite system, which can be released from the surround platform and communicate with the surround detection and Mars rover. The satellite carry solar sails, small infrared imager and other loads. To achieve track adjustment, the satellite is powered by solar pressure. Furthermore, it can use aerodynamic drag to pull itself into the Mars remote sensing orbit. Meanwhile, the satellite achieve autonomous navigation based on Mars and star position geometric relations, and evaluate the effect of orbit adjustment. In addition, aerobraking can be used to inverse Mars atmosphere characteristics. The communication between spacecrafts can add relay arc for the communication blind areas of the Mars rover. This study can provide a reference for exploring new forms of Mars detection.

Keywords: microsatellite, solar Sail, deep space, aerobraking