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THE SATELLITE PRELIMINARY DESIGN OF SELF-ADAPTIVE MAGNETIC RECONNECTION
EXPLORER

Abstract

It is widely known that the magnetic reconnection plays an important role in earth's magnetosphere and solar activities. The self-adaptive magnetic reconnection explorer (AME) is a planning mission to explore the mechanism of magnetic reconnection from the magnetopause (10Re height) to magnetotail (22Re height) during the coupling process in the solar-terrestrial system. This paper gives preliminary design of satellites in detail. Firstly, the satellite formation configuration is introduced. The magnetic reconnection exploration is arranging to be accomplished by the satellite formation consisting of one mother satellite and 12 children satellites, while the mother satellite is the center of the formation. The formation is divided into 3 layers to explore the magnetic reconnection in multi-scales, and each layer contains 4 sub satellites forming up a tetrahedron. The inner tetrahedron has a side length about 1km in the magnetopause to explore the magnetic reconnection in electron inertia scale, and is adjusted to 5km in the magnetotail. The middle tetrahedron has a side length about 40km in the magnetopause to explore the magnetic reconnection in ion inertia scale, and is adjusted to 200km in the magnetotail. The outer tetrahedron will keep the side length about 1.0Re to explore the magnetic reconnection in macroscopic scale. The satellite life is designed for more than 4 years. The magnetotail will be explored in first two years while the magnetopause will be explored in last two years. Then, The satellite orbit is optimized with kinds of factors taken into account, such as cost reduction, feasibility of orbit transferring, minimum fuel consuming, satellite formation configuration adjustment frequency and communication quality. The optimized result is adopting the orbit 1.2Re (perigee altitude) *22Re (apogee altitude). Finally, it is presented that the composition of satellite system, the satellite configuration and the payload deployment. The mother satellite contains 9 subsystems while the children satellite contains 8 and both satellites have the inter-satellite link subsystem for inter-satellite measurement and communication which would be described in detail in this paper.