SPACE TRANSPORTATION SOLUTIONS AND INNOVATIONS SYMPOSIUM (D2)
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ADAPTION AND SEPARATION TECHNOLOGY OF MICRO-SATELLITE BASED ON QB50 PROJECT

Abstract

In 1999 Tom Kenny from Standford University proposed a new design concept of pico-satellite,whose mass is 1kg with cube shape(10cm*10cm*10cm). Thus pico-satellite is also named Cubesat. Cubesats are used to help research institutions and universities over the worldwide to carry out scientific tests and explorations in space. Now over 100 universities and institutions have joined in Cubesat community. A lot of micro-satellites are also based on Cubesat standard, most of them are equipped one or two scientific test equipments as their payloads. The QB50 project has a scientific objective to study the temporal and spatial variations of a number of key parameters in the lower thermosphere with a network of 50 Cubesats. It will also study the re-entry process by measuring a number of key parameters during re-entry and by comparing predicted and actual Cubesat trajectories and orbital lifetimes. For the QB50, double Cubesats are included, with one half providing the usual satellite functions and the other half accommodating a set of identical sensors for lower thermosphere and re-entry research.

This study includes two parts. Firstly, according to the requirments of QB50, two satellite adapters-cylinder adapter and layered adapter were designed and analyzed. To aviod collisions during separation process of 50 Cubesats, the original cylinder adapter was improved and baffle plates was added to form layered adapter. Secondly, the separation devices of micro-satellite was researched, such as P-POD, TIT and Lightband.