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# SIDEWALL-MOUNTED PLANAR TYPE PROPULSION SYSTEM FOR POST MISSION DISPOSAL OF CUBESATS

**Abstract**

As the number of Cubesats launched into LEO increases rapidly, space debris caused by them is emerging as a serious problem. Accordingly, the FCC adopted a rule last year requiring all LEO satellites launched in the U.S to be disposed within five years after the end of the mission. Hence, in the satellite market, demand for devices that can de-orbit Cubesats after their mission is expected to increase significantly. Devices for post-mission disposal of Cubesats, such as solar sails and propulsion systems, have been developed and some have been commercialized. However, there were some limitations to be used in Cubesats because these devices required at least 0.5U size. Inside the Cubesat deployer, there is a gap of about 12 mm between the wall and the Cubesat. We thought that if the propulsion system can be made of a planar-type with a thickness of less than 12 mm so that it can be mounted on both sides of Cubesat, it can generate the necessary thrust for de-orbiting without taking up inside volume of the Cubesat. Therefore, in this study, a planar-type propulsion system applying this concept was designed and manufactured, and its performance was evaluated. The propulsion system consists of a propellant reservoir, a rupture disc, a heater, a catalyst bed, a combustor and a nozzle. Here, the rupture disc serves to physically separate the propellant and catalyst bed. When an electric signal is applied to the heater mounted on the surface of the rupture disc, thermal damage occurs to the rupture disc, and then combustion begins as it is ruptured by the pressure of the propellant. As the propellant, HAN, an green and storable propellant was used in this study. Target thrust and total impulse of the each combustor were 5 N and 16 Ns, respectively. The propulsion system was manufactered with a size of 300 x 100 x 12 mm to be mounted on a 3U-sized Cubesat. A combustion test of the manufactured planar-type propulsion system was conducted, and as a result, it was confirmed that the target performance was achieved.