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MODULAR AND LOW COST EXPANSION RESISTANCE INCREASING DE-ORBITING DEVICE FOR SMALL SATELLITE AND LARGE CONSTELLATION

Abstract

Because of its unique technical advantages, microsatellites have developed rapidly in recent years. In 2017, the number of small satellites under 500 kg launched worldwide reached 312, accounting for more than 80To solve this problem, we propose a low-cost modular post-mission disposal device by expanding and increasing resistance which can be widely equipped on micro satellites. The device has a volume of less than 10 cm3 and a weight of less than 800g. It can be inflated into a sphere with a diameter of 1.8 m in three hours. By increasing the resistance, the target of 24 kg mass on 600 km altitude orbit can be deorbited within one year. Due to the use of film forming and curing technology, the sphere does not need to be inflated after deployment. Therefore, compared with the traditional inflatable resistance-increasing device, there is no need to worry about the failure of the resistance-increasing structure caused by the impact of small debris. The device also has independent energy and signal receiving capability, which can make the satellite still have controllable deorbit ability after other parts of the satellite lose their function completely. At present, the device has completed prototype development and ground reliability experiment, and is carrying out space environment experiment. It is planned to demonstrate and verify its orbital descent capability by a 10 kg microsatellite deployed at an altitude of 500 km in 2020.