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DESIGN OF A LOW-COST NET CAPTURE CUBESAT FOR SPACE DEBRIS REMOVAL

Abstract

With the development of space technology, the number of satellites launches, especially the CubeSats, are dramatically increased, that worsens the Earth orbit environment with space debris and poses a risk to the operational satellites. Therefore, active space debris removal must be performed as soon as possible. This paper provides a concept design of a CubeSat system to demonstrate the key technology of net capture method for removing CubeSat sized targets in a low-cost manner. The mission consists of a CubeSat platform that will depart into two CubeSats, the chaser and the target. Net system installed on the chaser is capable of changing the shooting angle of the net, thus providing an adaptable capture of the target within a certain distance. The distance between the chaser and the target will be achieved by Lidar. At the end of capture, the chaser and the target are connected by a tether, and the chaser is under a risk of collision with the possibly tumbling target. Therefore, the collision avoidance control strategy is designed and the chaser is able to tow the target back to Earth safely. This design aims to assemble the CubeSat platform into a six-unit level of CubeSat in order to dramatically reduce the mass and cost, which is the main challenge of many CubeSat missions. It also aims to be one of the world's first demonstrations of key technologies of removing CubeSat sized targets.