

16th IAA SYMPOSIUM ON SPACE DEBRIS (A6)
Post Mission Disposal and Space Debris Removal (1) (5)

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SURREY SPACE CENTRE DEORBITING SAILS: LESSONS LEARNT AND NEW DEVELOPMENTS

Abstract

The Surrey Space Centre has performed several TRL raising projects for maturing deorbiting technology. Recently, the InflateSail CubeSat demonstrated deployment of a dragsail and a novel inflatable boom system to provide passive spacecraft stability. The debris removal demonstration payload deployed a 10m² transparent polymer drag sail, supported by four carbon fibre reinforced polymer (CFRP) booms. Launched on 23rd June 2017, the mission achieved rapid success through a successful deorbit from a 500km altitude orbit in only 72 days. InflateSail was the first successfully deployed Sail from a European spacecraft and the first successful use of inflatable structures on a CubeSat. The same sail deployment mechanism has been implemented for a 100kg class microsat on the RemoveDebris mission, launching Q2 2018 from the ISS. Building on the experience from these missions, the Surrey Space Centre is developing a range of large area deployable sails for application to a variety of mission profiles, platform masses and orbits in order to deorbit satellites quickly and thus reduce collision risks. The SSC is delivering one such system, designed as a self-powered deorbiting sail with high environmental durability with flight expected for H2 2018. This paper will review the flight experience for existing sails before addressing the considerations for appropriate dragsail design, sizing, and sail material selection. The paper will also describe the reliability and safety features designed in to self-powered deorbiting systems for use at end of mission life, as well as the associated concept of operations.