

SPACE DEBRIS SYMPOSIUM (A6)
Space Debris Removal Issues (5)

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DE-TUMBLING OF DERELICT SATELITES AS A COMPONENT OF ACTIVE DEBRIS REMOVAL

Abstract

While various methods of orbital debris mitigation are being actively studied, little work has been done to qualify the necessary systems to de-tumble derelict satellites. Essential components of any active debris removal (ADR) method is the ability to (1) determine, and (2) control the derelict's attitude, enabling the attachment of deorbit devices and a preferred reentry trajectory. Development of a method for determining the moment of inertia for a derelict satellite-mitigation satellite system is performed and de-tumbling methods analyzed. Methods of de-tumbling are divided into two general categories: application of a retarding torque, and increasing moment of inertia. Metrics used to characterize these methods are (1) the ability to reduce roll-rates to zero, (2) the time to reduce roll-rates to zero, (3) the power required to reduce roll-rates to zero, (4) generalized mass requirements, (5) technology readiness level (TRL), and (6) system cost. These metrics are calculated with respect to an SL-16 rocket body due to the large mass of the object and the distribution of these objects in altitudes with a high density of operational spacecraft and other debris.