

IAF SYMPOSIUM ON SPACE SECURITY (E9)

Political, Legal, Institutional and Economic Aspects of Space Debris Mitigation and Removal - STM
Security (1-A6.8)

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ECONOMIC THEORY APPLIED TO SPACE DEBRIS SCENARIOS

Abstract

The launch traffic to Low Earth Orbit (LEO) is undergoing significant changes: instead of launching few, complex, large and expensive spacecraft, the trend is now towards the use of small satellites less complex and of least cost. Large constellations, encompassing thousands of satellites in restricted regions of space, are emerging as important space assets. The intensifying commercial use of LEO and international debate regarding the stability of the space environment is a growing discussion among policy makers. Utilizing the SDM 5.0 evolutionary model developed by the Italian National Council of Research (CNR), the first step of this analysis is to estimate the growth of the space objects in LEO in the next decades. The analysis considers the space objects >10 cm, including active and defunct satellites, spent rockets bodies and fragments, along with varying future traffic, mitigation and remediation scenarios. Consequently, the analysis will focus on the probability of collision with active satellites and on estimating the cost of the damage to an active satellite deriving from the collision with a space object. Based on this, the study will assess the economic convenience of adopting technologies, which can mitigate the risk of collision, by comparing their cost to the damage cost previously identified. To conclude, building on empirical evidences, this paper will dwell on the following themes: i) considerations on how the operations of a free market with pricing signals can stimulate and encourage the formation of effective solutions to the space debris challenge, ii) the role that public institutions and international cooperation could play in space debris management.