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ADVANCED PASSIVE PROTECTION AND END-OF-LIFE STRATEGIES FOR SPACE DEBRIS MITIGATION

Abstract

As the threat of space debris increases, effective mitigation measures are critical for the sustainability of space missions. This paper investigates the integration of passive protection systems and end-of-life (EOL) strategies for spacecraft in debris-dominated environments. Focused on shielding and structural design, the study evaluates the use of advanced materials and protective coatings to prevent damage from hypervelocity impacts.

Furthermore, the paper explores EOL protocols, including controlled re-entry and debris disposal methods, to minimize future debris generation. Through simulations and real-world analog testing, we analyze the efficacy of mitigation techniques, emphasizing the importance of rigorous verification processes. The findings provide a comprehensive approach to reducing debris-related risks and ensuring the long-term viability of space operations.