

19th IAA SYMPOSIUM ON SPACE DEBRIS (A6)
Modeling and Risk Analysis (2)

Author: Mr. Subhadr Gupta

University of Petroleum and Energy Studies, India, guptasubhadr@gmail.com

Mr. Raj Khismatrao

University of Petroleum and Energy Studies, India, raj.p.khismatrao@gmail.com

Mr. Harsh Singh

University of Petroleum and Energy Studies, India, harsh.singh2000@gmail.com

Ms. Suvigya Gupta

University of Petroleum and Energy Studies, India, sg11.doon@gmail.com

Mr. Darsh Shukla

University of Petroleum and Energy Studies, India, darshnshukla@gmail.com

Mr. Adwait Sidhana

University of Petroleum and Energy Studies, India, 2000ad30wait@gmail.com

SPACE DEBRIS CATEGORIZATION AND SORTING USING MATLAB

Abstract

The development of technology has provided a leap for the humankind in the area of space technology and exploration which has led to a lot of significant discoveries through various missions to the vastness of space. Satellites that have been revolving around the planet provide a method for faster communication as well as collect valuable data for research and mapping. According to the database maintained by the Union of Concerned Scientists, as of April 2020, there are more than 2500 active satellites in the Earth's orbit, out of which 1918 are in Low-Earth Orbit. Throughout the past decades, a lot of these spacecraft have been decommissioned or declared dead. These spacecrafts still orbit around the planet or loiters in the void, creating problems for the active missions. Even the tiny particles in space are massive problems for the lively spacecrafts. A small piece of metal could disable or may even destroy an entire functional satellite upon collision. The European Space Agency estimates there to be more than 128 million chunks of material in the Earth orbit. As space agencies continue to exploit the place around our spectacular blue planet, they need to look up to the sustainable use of space. This creates a need for detection, analysis, categorization, and mitigation of these objects. This issue regarding space debris has not been addressed properly by the leading global space agencies. For a sustainable future in space, removal of debris becomes compliant. This paper discusses this issue and provides a categorization database for the existing debris. Space debris has been categorized based on size, orbital inclination, and altitude. The sorting of such objects requires a collective database of active satellites and space debris which has been obtained from the North American Aerospace Defense (NORAD) Catalog. Space debris clusters have been identified and marked critically from low to high, depending on their trajectory overlapping with the active satellites. The sorting that this paper presents will ease the process of selecting desirable debris for mitigation in the forthcoming time. This paper will contribute to the selection of the debris making the process smoother. An algorithm has been created to perform such an analysis. A MATLAB program has been developed with the help of that algorithm which can be used to analyze the updated NORAD database upon the command of the potential users.