

SYMPOSIUM ON SPACE DEBRIS (A6)  
Mitigation and Standards (4)

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## CHALLENGES FACED BY LEO SATELLITES DUE TO SPACE DEBRIS

**Abstract**

In the last 5 decades, the environment around the earth has gone from a debris free space to a zone clustered with man-made objects. With the spread of technical knowledge of launching a satellite around the world, even more nations are getting involved in the space launch sector and with the increasing launches, the enormous problem of space debris has come up. Space debris has substantially increased the threats to the launch activities and all the orbiting satellites are now in danger of an unexpected collision at any point of time. There are currently more than thousand active satellites orbiting the earth and along with them there are millions of space debris fragments going at speeds of several kilometers per seconds. Space debris is a threat to any spacecraft irrespective of the orbit. Though the quantity of space debris differs in different orbits, with the most concentration in the Low Earth Orbit and least in the High Earth Orbit. Low Earth Orbit have reached to the critical density of unwanted fragments and parts. Satellites now face many problems that range from damages to even destabilization of their orbit. These problems must be resolved in next few years or it will become very difficult to launch satellites in the low earth orbit in the coming years. The accumulation of the space debris presents a real threat to productive use of space. This paper seeks to explore the history of space debris and also list the problems that are now faced by any new satellites that are deployed in the low earth orbit. The orbital calculations for any new satellite that is launched today have become very complex and sometimes trajectory corrections have to be done in orbit to avoid a certain piece of junk. This paper explores all these challenges and explains some of the consequences if proper measures are not undertaken to curb space debris. As a case study, a typical university Nano satellite at 700 km of altitude will be analyzed for the problems and challenges it will face in the LEO.