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DESIGNING A STRUCTURE TO COLLECT SPACE DEBRIS THROUGH LORENTZ FORCE AND ORBIT DEVIATIONS OF THE SATELLITE.

Abstract

In the current scenario, space debris is currently one of the major problems which if not addressed immediately may halt space activity. The cascading effect of space debris where the present debris leads to the production of more debris with debris particles traveling at higher speeds. The given situation if left unchecked can lead to uncontrolled production of such debris material and lead to a halt of space activity in the upcoming years. We present an approach that uses the Lorentz force of two large rod-like structures in parallel interconnected by large magnetically charged metallic circular coils between them to collect debris in both LEO and GEO. The strength of the magnetic field can be varied as per the size of the debris. Most of the space debris is concentrated in the low earth orbit section. Using careful orbital calculations of the above satellite structure ad trajectory of space debris, the orbital path of the space debris can be changed and attracted towards the satellite with a particular velocity using magnetic forces. Also, the orbit of the satellite along with its inclination with the axis of the Earth and the strength of the magnetic field can be adjusted such that velocity and orbit of the debris material can be slowed down and captured in a container or deflected towards Earth itself. The latter may change depending on the size of the debris material. Using cold gas outbursts and ion propulsions, deviations can be proposed to the orbit of the satellite such that it can collect or deflect debris material in another area. The proposed structure would need refueling and the container of space debris would need to be removed at regular intervals when it gets full. Furthermore, a major volume of space debris can be collected through this method due to its high feasibility in a very limited period of time.