

SPACE DEBRIS SYMPOSIUM (A6)  
Space Debris Removal Concepts (7)

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SPACE DEBRIS REMOVAL FROM LOWER EARTH ORBIT AND GEOSYNCHRONOUS EARTH  
ORBIT USING ELECTRODYNAMIC TETHERS AND VASIMR TECHNOLOGY**Abstract**

Meeting Future goals for Orbital Cleanup will require highly efficient satellite and space vehicles that will clean up the myriad of broken and dead satellites, rocket stages and coolants. In course of time space debris has increased significantly and our earth orbit has become a junkyard, before it expands further, its need of the day to clean them up economically. Without Research and Development of proper design this problem will further increase. This paper focuses on a design to clean up Space Debris from the Lower Earth Orbit as well as from the Geosynchronous Earth Orbit that intervene in satellite operation and poses great threat to the launch of space crafts, PSLVs and GSLVs. Our vehicle design will be simple and precise. It would be a Hybrid Chemical-Electric Rocket integrated with a payload i.e. a kind of Clean up Satellite would be having Electro dynamic Tether propulsion system. It would be launched into the LEO using a space launch vehicle from where it will be injected into the orbit. This tethered satellite system will be using aluminum and copper cable as the tether and will utilize the ionosphere of earth for other requirements. During Satellite launch as a part of payload, a Robotic manipulator would also be launched which would be used to capture the space debris and bring it to the tether orbit. After that the Tether system will be deployed to it and the orbit will be further lowered using the drag effect. Eventually the drag induced by the tethers will reduce the altitude of the debris mass significantly, which would result in increased effect of the upper atmospheric drag and hence burning it up on re-entry phase. It will speed up the timetable of the re-entry and help in early cleanup of the space debris. As it doesn't use any propellant so it's economic and sustainable to clear large Space debris. To clear the GEO it would be using VASIMR (Variable Specific Impulse Magneto plasma Rocket) system satellite thrusters which will get attached to the geostationary satellite revolving in orbit and will push them out of the Earth orbit by providing required DeltaV needed for escaping the earth gravity totally. They will be left out in the free space, so as to make place in GEO for our communication satellites. Overall, this gives an insight and design concept for Space Debris Clean up System.