Active Space Debris Removal by Extreme Ultraviolet Radiation

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Abstract : In recent year the problem of space debris have become very serious. The mass of the artificial objects in orbit increased quite steadily at the rate of about 145 metric tons annually, leading to a total tally of approximately 7000 metric tons. Now most of space debris object orbiting in LEO region about 97%. The catastrophic collision can be mostly occurred in LEO region, where this collision generate the new debris. Thus, we propose a concept for cleaning the space debris in the region of thermosphere by passing the Extreme Ultraviolet (EUV) radiation to in front of space debris object from the re-orbiter. So in our concept the Extreme Ultraviolet (EUV) radiation will create the thermosphere expansion by reacting with atmospheric gas particles. So the drag is produced in front of the space debris object by thermosphere expansion. This drag force is high enough to slow down the space debris object's relative velocity. Therefore the space debris object gradually reducing the altitude and finally enter into the earth's atmosphere. After the first target is removed, the re-orbiter can be goes into next target. This method remove the space debris object without catching debris object. Thus it can be applied to a wide range of debris object without regard to their shapes or rotation. This paper discusses the operation of re-orbiter for removing the space debris in thermosphere region.

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