

Implication of Space Debris And Removal Methods

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Abstract- Space debris is an inactive man-made object in Earth Orbit such as include non functional spacecraft, abandoned Launch Vehicle Stages, Mission related failure and fragmentation debris. Space debris impact the object like explosion of Bomb inside spacecraft. In Existence of different methods the observed environment physical models. For mapping the propagated environment onto spatial and temporal distribution of object densities, transient velocities and impact fluxes. To eliminate the space debris by preferable active space debris Removal methods. About different removal methods and origin of space debris.

Keywords- About Space debris, Orbital debris, Space debris mitigation measures, Laser satellite, Tentacles, Debris object.

I. INTRODUCTION

The Space debris is an inactive human-made object, no longer in use and around the Earth. It poses threat to Spacecraft and Space activities. The main source debris Form decommissioned satellite, spend upper stage, mission related failure and fragment generate by collisions. The explosion of satellites and upper stages cause Pollutant in space environment.

Space debris impact on another object over 22,300 mph, making Effort like bomb explosion. The small debris damages the solar Panel, camera and sensors in spacecraft. The implementation of Mitigation measures to reduce the space debris population Growth. This paper has to explain the various methods for Space debris Removal. The Removal Methods has been used to reduces the Chance for collusion of spacecraft by debris object.

II. IMPACT OF SPACE DEBRIS

Orbital debris is an inactive manmade object in earth orbit. There is no orbital debris in beginning of space Exploration but nowadays rapid growth in space debris population in Low Earth Orbit. This problem retains to increase Probability to hit the spacecraft by orbital debris. The impact of space debris depend upon its sizes, they are

- Larger than 10cm
- Smaller than 10cm

- Smaller than 1cm
- Smaller than 3mm

Larger than 10cm

The size of the object is approximately 10cm more than larger size. The impact of object is equivalent to bomb blowing inside the spacecraft. It can be tracked, predictable and in some cases avoid collusion by maneuvers satellite. They are currently more than 22,000 object being tracked by Space Surveillance Network(SSN).

Smaller than 10cm

The size of space debris is smaller than 10cm, an impact of 5cm object is near to hit by a bus traveling at highway.

It cannot be tracked ,but it able to destroy spacecraft. Approximately 500,000 fragment orbited at Low Orbit Earth.

Smaller than 1cm

The debris object lesser than 1cm. It looks like a small pieces or granules sizes from 1cm to 3mm. Its impacts the satellite is nearer to impact of bullets on object body. Debris object was not able to make several damage in spacecraft. But it effects the components such as propellant tank, sensors, computers, solar panel. It can be estimated as million of pieces in Low Earth Orbit.

Smaller than 3mm

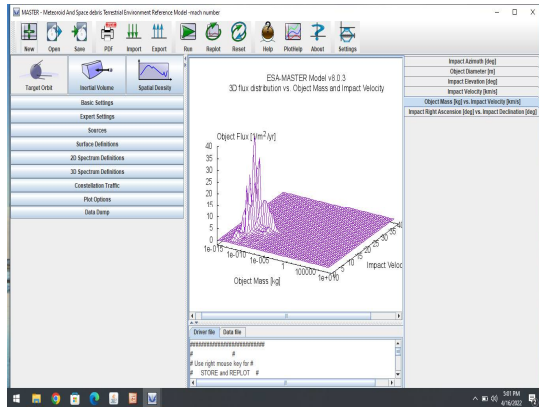
The debris object is size lesser than 3mm.the impact of aluminum particle is equivalent to the Hit by the baseball thrown by a major league pitcher. Mostly it effects the solar array and optical system, telescope. The shielding of spacecraft reduces is to prevent the damage from the debris.

III. ANALYSIS

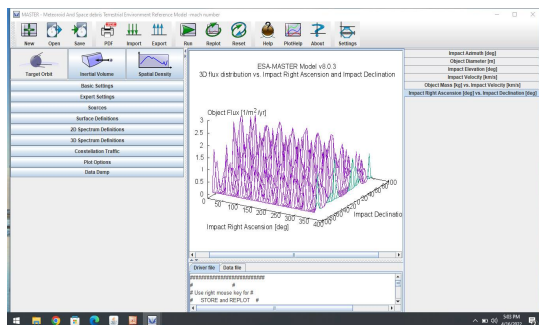
It has the reference of the space debris in which containing flux distribution using the MASTER 8.0.3 ESA reference model software. In this type of analysis for

distribution of flux over time with parameters such as impact velocities, impact object diameter, object mas, etc.

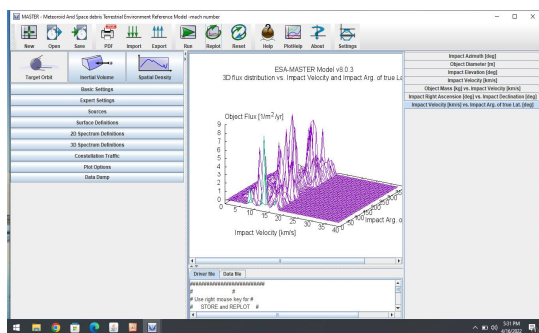
Flux Distribution



3D flux distribution vs object mass and impact velocity



3D flux distribution vs impact right declination and impact declination



3D flux distribution vs impact velocity and impact arg of true latitude

IV. ACTIVE SPACE DEBRIS REMOVAL METHODS

There are many conceptual method to remove the debris from the Earth orbit.

Tentacles

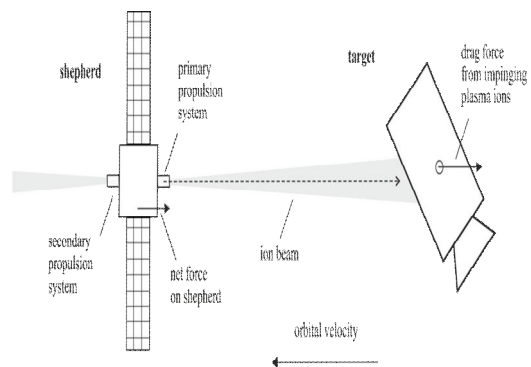
The clear space-1 is a 500 kilogram spacecraft with four robotic arms and it will launch at 2025. In Clear space awarded for space debris removal solution. Its first mission , the Clear space-1 will aim capture the upper part of owned spacecraft known as VESPA (Vega Secondary Payload Adapter) 112 kilogram object was launched in 2013.



How the robot tentacles may capture may our float in space trash

Laser Satellite

In this technique, object is determined by the shooting pulsed laser which reduce velocity and move the object to graveyard orbit. There are two methods suggested by researchers are ground and space based lasers methods,



Representation of laser satellite for deorbiting Space debris

VI. CONCLUSION

This paper present the brief introduction about the impact of space debris and active space debris removal methods. Establish the space debris categories based upon its size and events made space debris from the beginning of space age. The researchers suggested space debris removal

technique , but there is no space debris Removed from Earth orbit. Because of the high cost and complex to get function.

The removal methods used for specially designed satellite for 25 to 30 years for protect Disposal of the space debris. It is complex to trace the small debris and does not able to prevent collisions. These raises the risk of generation of new debris in space environment.

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