

Astrium ST's Active Debris Removal Systems

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The population of object in orbit and in particularly in polar orbits is increasing. The high flux will enhance the probability of collisions which will feed a further flux increase eventually yielding a cascading effect. This so called Kessler effect can be reduced or even avoided by actively removing some large pieces of debris - inactive satellites or launcher upper stages - on a yearly basis. Active debris removal requires several key technologies which are not generally mastered, yet. In particular the capture and de-orbitation of un-cooperative objects is challenging and employs several areas being not sufficiently mature, yet. This paper summarizes the activities of Astrium ST to mature the competences and to implement the technologies in chaser system concepts for active debris removal. In particular, the in-house activities to approach the un-cooperative debris, to capture the target and to process it will be described. Astrium ST will explain the GNC as well as visual navigation. An overview on capture technologies will be given and the associated de-orbiting strategies will be detailed. Eventually, the baseline system concepts will be presented including chaser designs for multiple and single target mission. The operation of multi target chaser vehicles requires considerable effort for the mission planning in order to minimize the delta-v budget and optimize the use of propellants. The results of various concurrent engineering sessions performed improve the mission design and vehicle concept will be reported.