

SPACE DEBRIS SYMPOSIUM (A6)
Space Debris Removal Technologies (5)

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CLAMPING MECHANISM – A TENTACLES BASED CAPTURE MECHANISM FOR ACTIVE
DEBRIS REMOVAL

Abstract

Space-debris around Earth is becoming a more and more significant threat to the proper functioning of our satellites in orbit. The active removal of five large debris objects per year from LEO seems to become mandatory for the near future to stabilize the debris population there. Case studies of potential targets led to the conclusion that the ESA-owned ENVISAT is the target of the highest interest to ESA after its failure in April 2012 due to its high mass of approximately eight tons and its orbit (800km/98) in one of the most densely populated regions with a high orbital lifetime. The de-orbiting of the non-operational ENVISAT is investigated within the ESA-funded phase A system study called “e.Deorbit”. Capturing of a non-cooperative satellite like ENVISAT is one major challenge of such a mission. As one of the most promising options the “assessment and simulation of a tentacles based capture mechanism for ADR” is performed. This activity works towards the design of a clamping mechanism concept to capture the debris and ensure a stiff link between the chaser and the target during the de-orbiting phase. This clamping mechanism follows a “capture before contact strategy”. Its preliminary design will be supported by a multi-body simulation of the capturing operation. The paper will show the design of the clamping mechanism as well as the results of the multi-body simulation of the mechanism operations.