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STUDY OF A HARPOON WITH A FOAM INJECTION SYSTEM FOR DEBRIS MITIGATION.

Abstract

Space debris such as dead satellites or used rocket stages orbiting our planet are becoming a huge problem that needs to be solved in order to avoid unexpected collisions in the future. One solution to mitigate that risk is to regularly deorbit major debris using a deorbiting spacecraft that would rendezvous and dock using a harpoon system before towing it towards a burn in the atmosphere. However this technology is a one-shot device and therefore several measures have to be undertaken to make sure the docking and the towing phases are properly done.

It is proposed to study in this paper, a hybrid system that is composed of a regular harpoon and a foam injection system. Once the harpoon is deployed in the debris, a large quantity of highly expandable foam is injected to strengthen the zone that will transmit the forces. The presentation will study the configuration while giving advantages and limitations of such a technology.