

SPACE DEBRIS SYMPOSIUM (A6)
Poster Session (P)

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A SYSTEM CONCEPT FOR THE ACTIVE SPACE DEBRIS REMOVAL DEMONSTRATION
MISSION**Abstract**

Space debris in low Earth orbit is becoming a severe threat to spacecrafts, especially the large debris with size more than 1m. The active removal of certain large debris objects in LEO is an effective way to prevent the long-term exponential growth of debris population. Based on a mini-satellite platform with rendezvous and approaching capabilities developed by DFH satellite Co. Ltd and the experience from space maintenance technology on-orbit experiment, a system concept for the demonstration mission of the approach, capture and active removal of large debris from low Earth orbit is proposed in this paper. The abandoned satellites and large rocket bodies are selected as the candidate targets for removal. By means of a suite of sensors including laser radar and optical cameras covering the different phases of the approach, the guidance, navigation and control (GNC) system of the spacecraft can accomplish orbit maneuver, rendezvous and final approach. Moreover, GNC system can provide de-spinning control after mating with debris object. Advanced multiple robotic arms with damp mechanisms and flexible end-effectors are used to capture and mate the identified debris object. The attaching of the de-orbiting device on debris is also realized by the robotic arm. In combination with orbit maneuver provided by the spacecraft, in this demonstration mission, the inflatable bag with large size is used to increase the atmospheric drag of the debris object, so the altitude of the debris object will decay rapidly and lead to a re-entry in a short period. Once the inflatable bag is installed and activated on the debris object, the spacecraft de-mate with the captured debris and start the maneuver to the orbit of another debris object, so multiple debris targets can be removed with a single mission.