IAF SPACE SYSTEMS SYMPOSIUM (D1)
Cooperative and Robotic Space Systems (6)

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VALIDATION AND DEMONSTRATION OF EROSS PROJECT: EUROPEAN ROBOTIC ORBITAL SUPPORT SERVICES

Abstract

The European Robotic Orbital Support Services (EROSS) project aims at developing and integrating key European robotic technologies to enable and demonstrate an autonomous solution for performing servicing tasks in orbit and many future rendezvous missions.

EROSS assesses and demonstrates the capability of the on-orbit servicing spacecraft to perform medium and close-range rendezvous, to capture and manipulate a client satellite to be serviced. The client satellite is considered collaborative and prepared as it is designed with specific features to ease the rendezvous and capture but more importantly to enable servicing operations such as refuelling and payload replacement.

The project embeds key European Technologies by leveraging on actuators, sensors, software frameworks and algorithms developed in previous European Projects and focuses on boosting their maturity. Firstly by increasing their functionalities in a synergetic way to enable their fast implementation on a space mission and secondly by validating their performances in representative environment for a defined mission scenario.

The current paper aims at presenting the mission demonstration scenario and the validation of each building blocks for the rendezvous mission, including visual sensors and capture actuators. The overall Guidance Navigation Control (GNC) architecture will be reviewed in the scope of the collaborative rendezvous considered in EROSS project, before presenting the resulting performances of rendezvous and capture. For instance, the gripper developed during the project is integrated within the robotic test bench of Thales Alenia Space in France for experimental validation. The tests will assess the compliance of the GNC architecture with the mechanical tolerances of the gripper system. The GNC performances presented in this paper are mainly derived from numerical simulations, while the experimental tests focus on the functional compliance of this gripper with the GNC architecture in terms of tolerances and delays.

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