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THE RVS3000 AND RVS3000-3D LIDAR SENSORS FOR RENDEZVOUS AND DOCKING MISSIONS

Abstract

Thanks to its robust design and accurate measurements, the Jena-Optronik RVS LIDAR sensors are the most frequently used rendezvous- and docking sensors for space applications, not only for the European ATV supply vessels to the International Space Station, but also for the Japanese HTV and the US-American Cygnus transport vehicle built by OrbitalATK. Its applications are limited, though, to rendezvous and docking to so-called cooperative targets that are equipped with a defined retroreflector pattern.

For future applications, like on-orbit servicing, manned space missions or planetary landing, a more powerful 3D imaging LIDAR system is required. Following various ESA and DLR German Space Agency projects, a new line of 3D LIDARs called RVS3000 and RVS3000-3D are currently being established as a more powerful, yet compact and cost-efficient successor to the RVS.

In the presentation we will review the properties of the RVS3000 and RVS3000-3D and its possible applications in LEO ISS servicing as well as potential future human spaceflight and space robotics activities in LEO and beyond. Following the conclusion of the system design, the first RVS3000 family Engineering Model was completed in spring 2017 and since then used for various measurement and test campaigns. In the presentation, we will summarize the main results of the Engineering Model test campaign and also review the related LIDAR sensor stimulation system that connects to the sensor for early validation of new mission scenarios that cannot easily be tested on ground. The presentation will include a review on our activities for the RVS3000-3D and possible image processing algorithms that may run onboard the LIDAR sensor.