

kHz SLR application on the attitude analysis of Technosat

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Technosat is an experimental mission of the Technical University of Berlin, which was launched on July 14, 2017 and has been tracked successfully by ILRS stations. Commercial off-the-shelf laser retroreflectors are used to demonstrate the feasibility and the credibility of attitude determination by using kHz SLR technique. Subject to the compact structure constraints, a maximum of 24 CCRs would have been allowed to be mounted on the 6 outer surfaces of 8-edge prism satellite (4 side faces, top face and bottom face). However, to achieve the goal of attitude and attitude motion determination the unique SLR signature of each side has been considered. Estimated by Degnan's radar link equation, the expected SLR detection probability of such a $\varnothing 10\text{mm}$ CCR is estimated. With a 45° incidence angle at a 600 km orbit the return rate is twice as high compared to LAGEOS which enables most of the ILRS stations to get a reasonable amount of returns.

In orbit, the attitude of Technosat varies from freely spinning, nadir-pointing or off-nadir-pointing according to the demands of different tasks. In this work, we will propose our results of the attitude analysis based on Graz kHz SLR data in comparison to records from other payloads, e.g. gyroscope.