

Performance of GPS-based accelerometry: CHAMP and GRACE

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The satellite missions CHAMP and GRACE are equipped with high-quality accelerometers for measuring the non-gravitational accelerations experienced by the satellites. Recently, several studies based on the CHAMP mission, have shown the feasibility of estimating these non-gravitational accelerations indirectly from precise GPS SST observations using state-of-the-art gravity field models. This so-called GPS-based accelerometry is complex, as it requires optimization with respect to arc length and temporal resolution of the estimated accelerations, as well as observation data weighting in conjunction with the constraints of the estimated accelerations.

In this paper an assessment is made of the optimal temporal resolution of the estimated non-gravitational accelerations for both the CHAMP and the GRACE mission. Several quality measures are taken into account to determine this optimum, like e.g. the recovery error, the correlation with the true (measured) accelerations, as well as the so-called contribution measure, which indicates whether the accelerations are determined by the observations or partly by the regularization. Finally, the performance of GPS-based accelerometry for both missions is compared.