SMOOTHENED ABSOLUTE KINEMATIC POSITION ESTIMATION OF LEO SATELLITE USING GPS OBSERVABLES

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Abstract

In this paper, our objective is to use the navigation signals (pseudorange and carrier phase measurements) from GPS to kinematically estimate the absolute position of a low Earth orbit satellite and its receiver clock biases. GPS observables can estimate the precise position of a satellite in near real time. The GPS satellite navigation file is downloaded from Scripps Orbit and Permanent Array Centre (SOPAC) website for starting epoch of 01-01-2016 00:00 UT. The observables are then generated for a Low-Earth-Orbit (LEO) satellite at an altitude of 901.4 km. The absolute position is estimated using pseudorange measurements. The accuracies obtained are (5.68 8.04 6.17) m in ECEF frame. This estimated absolute position is then smoothened with the time-differenced carrier phase measurements. The Kalman filter gains are computed in near real time. The smoothened accuracies obtained are (2.24 2.60 2.6982) m in ECEF frame, thus showing improved estimated absolute position accuracy.