

Abstract

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High Resolution Fine Acquisition Algorithm for GNSS Receivers

The signal acquisition stage of a GPS receiver detects GPS satellites in view and provides coarse estimate of the GPS signal Doppler frequency shift and code delay for use by the tracking loops. The accuracy of the signal acquisition has a direct influence on the tracking performance. The implementation of a GPS signal acquisition algorithm requires compromising between acquisition frequency resolution improvement and reduction in acquisition time. A high-resolution fine acquisition method is proposed to acquire the carrier frequency accurately after the completion of the coarse acquisition of the GPS signals. The proposed method uses Gram-Schmidt orthogonalization to provide robust spectral estimation of satellite Doppler frequency with less computational time. The performance of proposed method is evaluated against of the computational load for GPS L1 signal. Its performance was compared to the state of the art FFT and zero-padding FFT-based fine acquisition algorithms. The experimental results showed that the performance of the proposed method outperformed existing methods and it had sufficient acquisition accuracy for its application in the real world.