Abstract

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Enhanced GPS Narrowband Jamming Detection Using High-Resolution Spectral Estimation

Global positioning system (GPS) technology has enabled accurate positioning and navigation of jamming that deteriorates the positioning accuracy. We focus on accurate detection of GPS jammers in the frequency domain where fast Fourier transform (FFT) is predominantly used. An innovative high-resolution frequency estimation method to accurately detect single and multiple in-band continuous-wave jamming signals transmitted at very close-by frequencies is proposed. The proposed method utilizes orthogonal search that provides robust nonlinear spectral estimation to detect dominant jammer frequencies. The Spirent GSS 6700 GPS simulator was utilized in this study to generate several cases for the GPS L1 signal. The output of the GSS 6700 was acquired using the Novatel FireHose GPS frontend receiver that digitizes and down-converts the signal into in-phase (I) and quadrature (Q) samples. The results demonstrated its capabilities of simultaneously detecting more than one GPS jammer existing at close-by frequencies. It is also shown that jammer frequency estimates obtained for a single jammer are more accurate than those obtained by FFT. Furthermore, FOS yields more accurate results than FFT at considerably smaller window sizes.