

Abstract

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Direction of Arrival Estimation of GPS Narrowband Jammers Using High-Resolution Techniques

GPS jamming is a considerable threat to applications that rely on GPS position, velocity, and time. Jamming detection is the first step in the mitigation process. The direction of arrival (DOA) estimation of jamming signals is affected by resolution. In the presence of multiple jamming sources whose spatial separation is very narrow, an incorrect number of jammers can be detected. Consequently, mitigation will be affected. The ultimate objective of this research is to enhance GPS receivers' anti-jamming abilities. This research proposes an enhancement to the anti-jamming detection ability of GPS receivers that are equipped with a uniform linear array (ULA) and uniform circular array (UCA). The proposed array processing method utilizes fast orthogonal search (FOS) to target the accurate detection of the DOA of both single and multiple in-band CW jammers. Its performance is compared to the classical method and MUSIC. GPS signals obtained from a Spirent GSS6700 simulator and CW jamming signals were used. The proposed method produces a threefold advantage, higher accuracy DOA estimates, amplitudes, and a correct number of jammers. Therefore, the anti-jamming process can be significantly improved by limiting the erroneous spatial attenuation of GPS signals arriving from an angle close to the jammer.