Removal Of The Finite-Distance Source Effect On The Applebaum Array

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Summary

The effect of a finite-distance signal source on the performance of an Applebaum array has been studied extensively in the literature. It has been concluded that unless the Applebaum array is focused at the exact source location, the degradation of the output signal-to-noise ratio (SNR) becomes unacceptable. The automatic focusing technique (AFT), developed for long-wavelength imaging systems using nonadaptive linear arrays, is extended here to focus adaptive arrays such as the Applebaum type. Thereafter, the far-field steering vector is used successfully to form a beam approaching the desired signal while suppressing the interferences. Substantial improvements in data processing have been achieved through the use of a partial convolution in the frequency domain. It is also demonstrated that the AFT can be used when the signal source range lies in the beginning of the Fresnel region of a nonadaptive linear array with negligible loss in the output SNR