

## Comparative Analysis of Two Approaches to Joint Signal Detection, ToA and AoA Estimation in Multi-Element Antenna Arrays

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**Abstract :** In this paper two approaches to joint signal detection, time of arrival (ToA) and angle of arrival (AoA) estimation in multi-element antenna array are investigated. Two scenarios were considered: first one, when the waveform of the useful signal is known a priori and, second one, when the waveform of the desired signal is unknown. For first scenario, the antenna array signal processing based on multi-element matched filtering (MF) with the following non-coherent detection scheme and maximum likelihood (ML) parameter estimation blocks is exploited. For second scenario, the signal processing based on the antenna array elements covariance matrix estimation with the following eigenvector analysis and ML parameter estimation blocks is applied. The performance characteristics of both signal processing schemes are thoroughly investigated and compared for different useful signals and noise parameters.

**Keywords :** antenna array, signal detection, ToA, AoA estimation

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