

Direction finding with the sensors' gains suffering bayesian uncertainty —hybrid CRB and MAP estimation

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Abstract:

The paper analyzes how a sensor array's direction-finding accuracy may be degraded by any stochastic uncertainty in the sensors' complex value gains, modeled here as complex value Gaussian random variables. This analysis is via the derivation of the hybrid Cramer-Rao bound (HCRB) of the azimuth-elevation direction-of-arrival estimates. This HCRB is analytically shown to be inversely proportional to a multiplicative factor equal to one plus the variance of the sensors' gain uncertainty. This finding applies to any array grid geometry. The maximum a posteriori (MAP) estimator corresponding to this uncertain gain data model is also derived. Monte Carlo simulations demonstrate that this estimator approaches the lower bound derived.

Keywords

Sensor arrays, Stochastic processes, Uncertainty, Data models, Covariance matrices

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