

电子技术

宽带信号方位估计的改进RSS方法

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摘要:

为了降低宽带信号旋转信号子空间 (rotational signal subspace, RSS) 方位估计算法的运算量和分辨门限, 针对中心对称阵列, 将实值处理过程和信号子空间缩放MUSIC (SSMUSIC) 方法引入宽带信号方位估计, 提出了一种宽带信号方位估计新方法。该方法首先使用左实变换矩阵将双向平滑后的各个频率子带的数据协方差矩阵变换为实数矩阵, 从而大大降低了运算量; 然后使用RSS方法选取聚焦矩阵对各个频率子带的实协方差矩阵进行变换, 得到同一参考频率点的数据协方差阵; 最后利用基于子空间斜投影的SSMUSIC算法进行一维搜索来求得各个目标的方位角。仿真实验结果表明, 该方法比常规宽带RSS方法运算量小, 且具有更低的分辨门限和更小的均方误差。

关键词: 宽带信号 实值处理 聚焦矩阵 旋转信号子空间 SSMUSIC

Improved RSS method for the direction finding of wideband sources

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Abstract:

In order to reduce the computational complexity and resolution threshold of the conventional rotational signal subspace (RSS) algorithm for wideband signals, the real value transforming process and the SSMUSIC method are introduced for central symmetric arrays to propose a new direction finding method for wideband sources. This method first transforms the complex data covariance matrices after forward backward smoothing at different frequencies into real ones by a left real transforming matrix, which achieves a substantial reduction of the computational load in later eigen decompositions. Then the conventional RSS algorithm is applied to get focusing matrices for different frequencies and these focusing matrices are further used to transform data covariance matrices into ones at a common reference frequency. Finally the direction of sources are obtained by one dimensional search of the maxima of an improved MUSIC estimator called SSMUSIC. Simulations show that the proposed method reduces not only the computational overhead but also the resolution threshold and MSE noticeably.

Keywords: wideband source real value processing focusing matrix rotational signal subspace (RSS) SSMUSIC

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