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论文与技术报告

非圆信号多级维纳滤波MUSIC测向方法

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摘要：

为降低非圆信号的MUSIC(记为NC-MUSIC)测向算法的计算量，提出了基于多级维纳滤波的NC-MUSIC算法。首先，该算法不需要估计样本协方差矩阵和对其特征值分解，而将非圆信号特性用于多级维纳滤波算法，构造出扩展阵列输出矩阵,利用多级维纳滤波的递推特性求出信号子空间；其次，为了进一步降低算法的计算量，推导出信号子空间的谱峰一维搜索公式进行非圆信号谱峰搜索的计算，快速估算出目标的方位值。仿真结果和计算复杂度分析表明，新算法不但在均方根误差性能上与其它快速算法相似，均接近于NC-MUSIC算法，具有良好的估计性能，而且降低了NC-MUSIC算法的计算量，使其计算复杂度小于非圆信号扩展传播算子快速测向算法的计算复杂度。证实了新算法快速有效的估计性能。

关键词： 波达方向估计； MUSIC算法； 多级维纳滤波； 非圆信号

MUSIC Algorithm Based on MSWF for Non-Circular Signals

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Abstract:

The MUSIC algorithm for non-circular (NC-MUSIC) based on multistage wiener filters (MSWF) was proposed to reduce the complexity for non-circular signal. Firstly, the proposed method avoided the estimate of the covariance matrix and its eigendecomposition, and made use of the MSWF method with the characteristic of non-circular signal. Array extend output matrix was constructed and signal subspace was realized with recursive characteristics of MSWF which reduced the computation greatly. In the next place, reducing the complexity further, 1-D spectral peak searching formula of signal subspace was derived, to do calculation in the part of searching spectral peak for non-circular signals. Then, bearing estimation of sources could be calculated rapidly. The simulation results indicate that, being similar with the RMSE performance of other fast algorithms, the RMSE performance of new method is closer to that of NC-MUSIC algorithm. The analysis of the complexity shows that, without complex computation for the NC-MUSIC algorithm, the computational complexity for the new method is smaller than that of the extended propagator method. It is given to demonstrate the rapid and effective performance of the proposed method.

Keywords: Direction Of Arrival Estimation MUSIC Algorithm Multistage Wiener Filter Non-circular Signal

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