

短文与研究通讯

一种基于方差融合的双均匀线阵阵列测向算法

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摘要:

本文提出了一种基于双均匀线阵的快速高精度测向算法。针对双均匀线阵不同轴上的接收噪声互不相关的特点, 可以得到理论上不含噪声的互相关矩阵。并且由于在两个轴上的阵列流型均具有移不变特性, 因此本文所提的快速算法首先利用x轴上最大不重叠的两个子阵列对y轴上最大不重叠的子阵列做互相关, 利用y轴上最大不重叠的两个子阵列对x轴上最大不重叠的子阵列做互相关, 接着对上述两个相关矩阵采用旋转不变子空间算法, 分别计算出目标的角度, 再利用方差融合的方法, 将两次求得的角度信息进行融合, 最后得到较高精度的角度信息, 理论分析表明该算法是无偏的, 并且在较高信噪比下趋近于克拉莫罗界。最后利用蒙特卡洛仿真验证了本算法的有效性。

关键词: 双均匀线阵 互相关矩阵 旋转不变子空间算法 方差融合

A DOA Estimation Algorithm Based on Variance Fusion with Double Uniform Linear Array

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Abstract:

A fast high precise DOA finding algorithm based on double uniform linear arrays has been proposed in the paper. Based on the property of the double uniform linear arrays, i.e., the noise of arrays at different axis are uncorrelated, two noise free cross-correlation matrices are obtained theoretically. By using the property of shift-invariant of both array manifolds, first a cross-correlation matrix is calculated with the two maximum non-overlapping sub-arrays in x-axis and the maximum non-overlapping sub-array in y-axis, and a cross-correlation matrix is also computed with the two maximum non-overlapping sub-arrays in y-axis and the maximum non-overlapping sub-array in x-axis. ESPRIT algorithm is employed to generate two group DOAs with the two cross-correlation matrices, respectively. Then the two group DOAs are fused with variance fusion algorithm and higher precise DOA is obtained. Theoretical analysis shows the proposed algorithm is unbiased and can approach CRB at higher SNR. Monte Carlo simulations verify the effectiveness of the proposed method.

Keywords: Double Uniform Linear Array Cross-Correlation Matrix Estimation of Signal Parameters via Rotational Invariance Techniques Variance fusion

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