

论文

## 一种低复杂度的ESPRIT新算法

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摘要

该文提出了一种基于QR分解的Power-ESPRIT (以下简称QP-ESPRIT算法) 新算法。首先使用采样数据协方差矩阵的幂(Power)获得噪声子空间的估计, 然后对噪声子空间进行QR分解并使用R矩阵估计信源个数, 提出了无特征分解的信源个数检测算法——SDWED算法。进而, 信号子空间的特征向量就可以由Q矩阵确定, 从而应用ESPRIT算法获得信源波达方向的估计。该算法不需要预先知道信源个数的先验知识以及分离信号与噪声特征值的门限。在确定信源个数和子空间估计的同时, 本文算法与传统的基于奇异值分解算法相比, 具有近似性能时却拥有较低的计算复杂度。仿真结果证明了该方法的有效性。

关键词 [阵列信号处理](#) [ESPRIT](#) [波达方向](#) [信源个数检测](#)

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## A Novel and Low Complexity ESPRIT Method

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Abstract

In this paper, a low complexity ESPRIT algorithm based on power method and QR decomposition is presented for direction finding, which doesnot require the priori knowledge of sources number and the predetermined threshold in separation of the signal and noise eigen-values. Firstly, the estimation of noise subspace is obtained by the power of covariance matrix and a novel source number detection method without eigen-decomposition is proposed based on QR decomposition. Furthermore, the eigen-vectors of signal subspace can be determined according to Q matrix, and then the directions of signals could be computed by the ESPRIT algorithm. In determining the source-number and subspace, the proposed algorithm has a substantial computational saving with the approximation performance compared with the Single-Vector-Decomposition (SVD) based algorithm. The simulation results demonstrate its effectiveness and robustness.

Key words [Array signal processing](#) [ESPRIT](#) [Direction Of Arrival\(DOA\)](#) [Source number detection](#)

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