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利用分数低阶空时矩阵进行冲击噪声环境下的DOA估计

何劲, 刘中

南京理工大学 电子工程系, 江苏 南京 210094

DOA Estimation in Impulsive Noise Environments Using Fractional Lower Order Spatial-Temporal Matrix

HE Jin, LIU Zhong

Department of Electronic Engineering, Nanjing University of Science and Technology, Nanjing 210094, China

摘要

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摘要 研究冲击噪声环境下的信号DOA估计问题。在对称 α 稳定(S α S: Symmetric α -stable)分布冲击噪声假设下,定义了一个阵列接收数据的广义分数低阶空时矩阵。理论分析表明,对广义分数低阶空时矩阵进行奇异值分解可获得噪声子空间估计。与信号空间DOA估计技术相结合,提出一种新的基于信号空间分解的DOA估计算法。该算法在低信噪比下对强冲击噪声具有更好的抑制作用。计算机仿真证明了算法的有效性。

关键词: DOA估计 冲击噪声 对称 α 稳定分布 分数低阶空时矩阵 奇异值分解 MUSIC算法

Abstract: This paper is concerned with the direction-of-arrival estimation problem in impulsive noise modeled as symmetric α -stable (S α S) distribution. A generalized fractional lower order spatial-temporal matrix (FSTM) of the array measurements is defined. Theoretical analysis shows that the matrix FSTM can be used to obtain the estimation of noise subspace. Then a new DOA estimation algorithm using subspace-based techniques is proposed. The algorithm is much efficient to restrain the strong impulsive noise for low signal-to-noise ratio (SNR) case. Simulation results demonstrate the effectiveness of the proposed algorithm.

Keywords: direction-of-arrival estimation impulsive noise symmetric α -stable distribution fractional lower order spatial-temporal matrix singular value decomposition MUSIC algorithm

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