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应用

离散傅里叶变换及变参考阵元特征法在相干信号估计中的应用

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摘要:
本文讨论理想条件下均匀线阵(ULA)对相干入射信号的高分辨测向问题。在分析经典多重信号分类法(MUSIC)对相干信号测向失效原因的基础上提出新算法, 它利用1) 离散傅里叶变换(DFT)估计入射信号数目; 2) 变参考阵元重构入射信号功率矩阵估计入射信号方位角。通过与经典MUSIC算法比较验证了该算法对相干入射信号估计的可行性, 并经过进一步分析得出如下结论: 1) 文中介绍的算法在不减少阵列有效口径前提下能够对高度相干信号进行高分辨测向; 2) 在低信噪比条件下能够精确估计入射信号方位角; 3) 随着阵列中阵元数目的增加, 阵列分辨率逐渐提高。

关键词: ULA; DFT; 高分辨测向; 变参考阵元法

DFT and Shift Reference Sensor Method Applied in Coherent Signal Parameter Estimation

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Abstract:
This paper concerned with high-resolution direction finding of coherent signals incident on ULA (Uniform Linear Array). Based on the analysis of the reason of the classical MUSIC failure in the case of coherent signals existence, a new coherent signal parameter estimation algorithm was developed. The algorithm estimates the number of incident signals using DFT (Discrete Fourier Transform), and then estimates direction of arrival by shift reference sensor method in reconstructing power matrix of incident signals. Compared to the classical MUSIC, the algorithm performs well when there were coherent signals. Simulating on computer were applied to verify the algorithm, and we found that: 1) the new algorithm can be used to high-resolution direction finding of coherent signals without reducing array effective aperture; 2) it can estimate number of incident signals accurately in low SNR (Signal Noise Ratio); 3) The resolution of the algorithm becomes much higher when the number of sensors increases.

Keywords: ULA DFT high-resolution direction finding shift reference sensor method

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