

电子技术

基于二维空间平滑的波束域MUSIC算法

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摘要:

针对强相关及多径信号环境下, 基于均匀平面阵的高分辨方法无法准确估计信号的二维到达角以及运算量大等问题, 提出了一种基于二维空间平滑的波束域MUSIC算法。该方法首先沿均匀面阵的两维方向对阵列接收数据进行二维空间平滑, 实现相关源的解相关; 然后将空间平滑后阵元空间的数据变换到波束域以降低计算量和系统复杂性; 最后利用波束域MUSIC算法估计相关信号的二维角度。该算法能有效地对相关信号进行解相关, 在降低传统的高分辨方法运算量的同时, 可以获得比阵元空间处理更稳健的测角性能。理论分析和数值仿真结果验证了算法的有效性。

关键词: 二维空间平滑 相关信号 波束域MUSIC 均匀平面阵

Beamspace MUSIC method based on 2D spatial smoothing

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Abstract:

In order to reduce the computational complexity and increase the estimation accuracy of the traditional high-resolution methods used in uniform planar array with strongly correlated or multi-path incident signals, a beamspace multiple signal classification (MUSIC) method based on two-dimensional spatial smoothing is proposed. Spatial smoothing is implemented along both dimensions firstly to de-correlate the coherent signals. Then the de-correlated array data in element space are transformed to that in beamspace with much smaller size. Finally, 2D angles of coherent signals are obtained by using the beamspace MUSIC. The novel method can de-correlate the coherent signals effectively, and can obtain more robust estimation properties with much lower computational burden compared with the traditional high-resolution methods. Simulation results verify the effectiveness of the proposed method.

Keywords: 2-D spatial smoothing coherent signal beamspace MUSIC uniform rectangular array (URA)

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