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论文

一种简便的MIMO阵列雷达CFAR检测器

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摘要:

本文提出了一种适用于MIMO阵列雷达的简便的CFAR检测器, 它利用了MIMO阵列雷达观测空间维数高的特点, 通过直接滤除杂波干扰子空间的方式抑制杂波和干扰。该检测器的简便性在于杂波子空间可以离线估计与存储, 而干扰子空间的估计也只需在低维空间上进行, 而其原因是在估计杂波和干扰子空间时没有利用距离参考单元观测样本, 而是利用了已知的系统参数、杂波子空间结构以及干扰协方差矩阵的模块对角性质。仿真结果表明, 在杂波的理想模型条件下, 选择适当的估计方法可以获得较高的杂波子空间估计精度, 由此得到的CFAR检测器的性能也非常接近于已知杂波干扰子空间条件下的检测性能。

关键词: MIMO阵列雷达; 长球面波函数; 杂波子空间估计; CFAR检测器

A Facilitated CFAR Detector for MIMO Array Radar

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Abstract:

In this paper, a facilitated CFAR detector is developed for MIMO array radar, where a distinctive feature of MIMO array radar, large observation space, is used to suppress clutter and jammer by way of directly filter out clutter and jammer subspace. The facilitation of this CFAR detector lies in the fact that the clutter subspace can be estimated off-line and stored in the memory, and the jammer subspace can be estimated in low dimension space, by reason that it is not samples in other range cells but the known system parameters, the clutter subspace structure and the block-diagonal property of jammer covariance matrix that are used to estimate the clutter and jammer subspaces. Based on the ideal model of clutter, simulations show a high accuracy of clutter subspace estimation can be obtained with appropriate estimation method, and also show the detection performance of the resulted CFAR detector approaches that of the detector with known clutter and jammer subspaces.

Keywords: MIMO Array Radar; Prolate Spheroidal Wave Function (PSWF); Clutter Subspace Estimation; CFAR Detector

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