

算法研究

OFDM-MIMO雷达体制的多径抑制性能分析

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摘要:

本文针对多径环境下对低空动目标的检测问题, 提出了基于正交频分多路复用-多输入多输出(OFDM-MIMO)雷达体制的多径抑制方法。由于多径回波之间的相位差是随机的, 向量叠加后导致接收回波时强时弱, 使得检测性能急剧下降, OFDM通过同时携带不同频率的载波能够带来频率分集, 同时MIMO通过阵元的分布能够带来空间分集, 且不同的路径回波具有不同的多普勒频移, 因此频率分集和空间分集技术可以降低多径信号对消的概率, 有效地抑制镜面反射多径干扰。本文在广义多元变量分析的框架下建立了参数化的测量模型, 并且采用广义似然比检测方法对目标进行了检测。仿真结果验证了采用OFDM-MIMO雷达体制能够带来目标检测性能的提高。

关键词: 多径效应; 正交频分多路复用; 多输入多输出; 广义似然比检测; 目标检测

Performance of OFDM-MIMO Radar for Multipath Suppression

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Abstract:

A method based on orthogonal frequency division multiplexing-multiple input multiple output (OFDM-MIMO) radar configuration is proposed to solve the multipath problem and detect moving target at low altitude. As the phase difference between the multipath echo is random, Vector superposition of the received echo is sometimes strong and sometimes weak, and the detection performance declined rapidly. Through carrying different frequency carrier, OFDM can provide frequency diversity, and through array distribution, MIMO can provide spatial diversity and different Doppler shifts over different paths. The frequency and spatial diversity reduce the probability of multipath cancellation, and solve the specular multipath problem more effectively. Parametric measurement models are developed under the generalized multivariate analysis (GMANOVA) framework, and generalized likelihood ratio test (GLRT) is employed to detect target. The simulation results verify the improvement of performance under OFDM-MIMO radar configuration.

Keywords: multipath effect orthogonal frequency division multiplexing multiple input multiple output generalized likelihood ratio test target detection

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