

### 基于矢量传感器MIMO雷达的发射极化优化DOA估计算法

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## Transmitted Polarization Optimization for DOA Estimation Based on Vector Sensor MIMO Radar

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摘要

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摘要 针对常规矢量传感器MIMO雷达没有利用发射极化信息导致波达方向(DOA)估计精度较差的问题,该文提出一种克拉美罗界(CRB)最小化的发射极化优化算法。首先建立矢量传感器MIMO雷达的接收信号模型;然后分析固定发射极化矢量传感器MIMO雷达DOA估计算法的不足;接着推导任意发射极化状态下的CRB,计算最小CRB对应的极化状态;最后利用该优化极化状态采用固定极化DOA估计算法得到DOA估计。该算法的DOA估计精度高于固定极化DOA估计算法。且该算法的2维DOA估计可自动配对,发射电磁矢量传感天线位置可任意。仿真结果证明了该算法的有效性。

关键词: MIMO雷达 波达方向估计 电磁矢量传感器 极化优化 克拉美罗界

Abstract: For the issue of the bad Direction Of Arrival (DOA) estimation accuracy entailed by not utilizing the transmitted polarization information in electromagnetic vector sensor MIMO radar, a transmitted polarization optimization algorithm is proposed based on minimizing the Cramér-Rao Bound (CRB). First, the signal model of electromagnetic vector sensor MIMO radar for DOA estimation is proposed. Second, the drawbacks of the existing fixed polarization DOA estimation algorithm are analyzed. Third, the CRB under arbitrary polarization is derived and the polarization state corresponding to the minimum CRB is computed. Finally, with the optimal polarization, the DOA can be estimated by the fixed polarization DOA estimation algorithm. The proposed algorithm can provide better estimation accuracy than the fixed polarization DOA estimation algorithm, and remain the advantages of automatic pairing between the two dimensional DOA estimation and arbitrary placement of the transmitted electromagnetic vector sensor antennas. Simulation results verify the effectiveness of the proposed algorithm.

Keywords: MIMO radar DOA estimation Electromagnetic vector sensor Polarization optimization Cramér-Rao Bound (CRB)

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