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# 基于多载频MIMO雷达的Radon-Fourier变换盲速旁瓣抑制

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# Blind Speed Side Lobe Suppression in Radon-Fourier Transform Based on MIMO Radar with Multi-carrier Frequency

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摘要

长时间相干积累方法Radon-Fourier变换(RFT)中盲速旁瓣(BSSL)现象会导致雷达虚警增加、目标检测性能降低。针对BSSL问题,给出了一种基于多输入多输出(MIMO)雷达多载频设计的BSSL抑制方法。首先根据载频与BSSL分布的关系,详细推导了BSSL不交叠的约束条件;然后基于该约束条件给出了具体的载频设计公式。利用设计的载频可得到具有不交叠BSSL的两个RFT输出,通过联合处理这两个RFT输出,可实现BSSL抑制。给出了BSSL抑制性能的评价方法。理论分析和数值实验结果表明,本文算法能够在不降低RFT相干积累性能的同时,有效实现BSSL抑制。

关键词： MIMO雷达 长时间相参积累 Radon-Fourier变换 盲速旁瓣抑制 载频设计

Abstract:

Blind speed side lobe (BSSL) in the long time coherent integration method of Radon-Fourier transform (RFT) can not only increase false alarm probability but also deteriorate radar detection performance. To address the BSSL problem, this paper proposes a novel BSSL suppression method based on the multi-carrier frequency design of a multiple input multiple output (MIMO) radar. First, based on the relationship between the carrier frequency and the distribution of BSSL, the non-overlapping constraint of BSSL is derived. Then, the multi-carrier frequency design method is provided in detail according to the constraint. By using the designed carrier frequencies, two RFT outputs with non-overlapping BSSL can be obtained. By jointly processing the RFT outputs, BSSL suppression can be realized. Furthermore, an evaluation method of the BSSL suppression is also provided. Both theoretical analysis and numerical experiments show that the proposed method can effectively suppress BSSL without deteriorating the integration performance of the RFT.

Keywords: MIMO radar long time coherent integration Radon-Fourier transform blind speed side lobe suppression carrier frequency design

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