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## 基于Keystone变换和MDCFT的高机动弱目标检测与参数估计

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### Keystone Transform and MDCFT-based Detection and Parameter Estimation for Maneuvering Weak Targets

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摘要

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#### 摘要

常规雷达对隐身、超声速和高机动目标存在回波信噪比不足、距离徙动和多普勒谱扩展问题。将Keystone变换和修正离散Chirp-Fourier变换(MDCFT)相结合,提出了一种新的雷达信号处理算法。该算法通过Keystone变换补偿距离徙动问题,利用MDCFT对多普勒谱严重扩展的目标回波进行相参积累,提高目标检测性能的同时完成了对目标参数的估计,且该算法在方位向欠采样时仍可适用。最后对算法运算量及性能进行了分析,通过仿真验证了该算法的有效性。

关键词: 长时间相参积累 目标检测 参数估计 Keystone变换 修正离散Chirp-Fourier变换

#### Abstract:

Detection of weak, supersonic and maneuvering targets is a great challenge for traditional radar as the signal-to-noise ratio of the target echoes is very low, and range cell migration and Doppler cell migration occur. To solve these problems, the Keystone transform and modified discrete Chirp-Fourier transform (MDCFT) are combined and a novel radar signal processing method based on this combination is proposed. The range cell migration is compensated by the Keystone transform, and then coherent integration of the Doppler spectrum spread echo is performed by the MDCFT. Furthermore, the method can perform parameter estimation at the same time of detecting the targets, which improves the efficiency of radar signal processing. Finally, the computational complexity and the performance of the method are analyzed, and the effectiveness of the method is verified by simulations.

Keywords: long term coherent integration target detection parameter estimation Keystone transform modified discrete Chirp-Fourier transform

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