

利用样本协方差矩阵特征值分解实现双通道SAR动目标检测

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Dual Channels SAR Ground Moving Target Detection with Eigen-decomposition of the Sample Covariance Matrix

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摘要

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摘要 该文针对机载双通道SAR-GMTI系统及实测数据,提出一种新的地面慢动目标检测方法。该方法基于双通道样本协方差矩阵特征值分解,将杂波第2特征值和干涉相位联合统计特性的研究结果用于慢动目标检测,即根据给定的恒虚警概率确定一条联合分布的第2特征值—干涉相位等高线作为门限检测曲线,同时结合第2特征值、干涉相位门限预处理,实现地面慢动目标的精确检测。实测数据实验结果表明:该方法不但扩大了慢动目标的可检测速度范围,同时还降低了系统的虚警概率。

关键词: 动目标检测 样本协方差矩阵 特征值分解 联合概率分布 等高线

Abstract: A novel approach to moving target detection is proposed for dual-channel SAR system. This approach is on the basis of eigen-decomposition of the sample covariance matrix and examines the statistic of the second eigenvalue and the Along-Track Interferometric (ATI) phase for ground moving target indication. Based on this statistic, a new Constant False Alarm Rate (CFAR) detector can be designed to solve the problem of GMTI. To detect slow moving targets more accurately, the second eigenvalue and the ATI phase pre-thresholds are implemented before a CFAR detector. Experimental results on measured SAR data are presented to demonstrate that this novel detector has wider range of detection velocity and lower false alarm probability.

Keywords: Moving target detection Sample covariance matrix Eigen-decomposition Joint probability distribution Contour line

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