



航空学报 » 2005, Vol. 26 » Issue (6) : 748-753 DOI:

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分数傅立叶变换用于抑制SAR杂波背景检测慢速动目标

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Symmetry FrFT Used to Suppress the Fixed Background Clutter to Detect Moving Target in a SAR Image

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摘要

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摘要 慢速运动目标在时、空、频域上都落入主杂波区。利用单通道SAR图像中静止背景的信息抑制静止杂波,可改善检测动目标的性能。分数傅立叶变换是线性变换,不存在交叉项,采用分数傅立叶变换搜索匹配动目标信号,使其能量汇聚。对称计算旋转角正负对称的分数傅立叶变换,在两个对称的分数傅立叶域中得到两个复信号,这两个复信号中静止背景的模处处相同,而包含动目标的区域,模的幅度有很大差别,计算对称的分数傅立叶域信号对应位置模的差,取绝对值,可对消静止背景,敏锐地检测动目标。实测数据表明本算法有效。

关键词: 合成孔径雷达 移动目标检测 分数傅立叶变换

Abstract: In single channel SAR, the echo from a slow moving target is confused with ground clutter in time, space and frequency domains. If the information about fixed clutter in SAR image can be used to suppress the background clutter, the detection of moving target will be easy. The fractional Fourier transform is a linear operator, and will not be influenced by cross terms. The FrFT is a way to concentrate the energy of the echo from a ground moving target. In two symmetry fractional Fourier domains with two inverse rotation angles of every SAR image tangential line, the static clutter's spectrums are same, while the moving target's are different. The absolute value subtracting of the two signals can be expected to have superior moving target detection performance. The experiment result proveds the validity of this method.

Keywords: synthetic aperture radar moving target detection fractional Fourier transform

Received 2004-12-06; published 2005-12-25

引用本文:

陈广东;朱兆达;朱岱寅. 分数傅立叶变换用于抑制SAR杂波背景检测慢速动目标[J]. 航空学报, 2005, 26(6): 748-753.

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