

### 一种基于频域子带合成的多发多收高分辨率SAR成像算法

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## A High-resolution Imaging Algorithm for MIMO SAR Based on the Sub-band Synthesis in Frequency Domain

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摘要

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**摘要** 针对传统单通道SAR系统无法同时实现方位向高分辨率和大测绘带宽的不足, 该文研究了一种基于多载频LFM波形的方位多孔径MIMO SAR系统, 建立了相应的几何模型, 详细推导了其回波表达式, 并提出了一种基于频域子带合成的MIMO SAR高分辨率成像算法。该算法将方位向多普勒解模糊, 改进的距离向频域子带合成和CS成像算法相结合, 能够同时实现2维高分辨率和大测绘带宽, 且提出的频域子带合成法较传统时域和频域合成法更高效实用。理论分析和计算机仿真结果验证了其有效性。

**关键词:** 合成孔径雷达 多发多收 高分辨率宽测绘带 多普勒模糊 频域子带合成

**Abstract:** Considering the contradiction between the azimuth resolution and the swath width for the traditional SAR, a MIMO SAR system with multiple-carrier-frequency LFM waveform is researched. The corresponding geometrical model is built, and the expressions of the echo signals are derived in detail. A novel imaging algorithm based on the sub-band synthetic technology in frequency domain is proposed. This algorithm which integrates the removing of azimuth ambiguities, the synthesis of the sub-band and the CS imaging can realize 2-D high resolution and wide swath simultaneously. And the improved sub-band synthetic algorithm has more efficiency and practicality than the traditional sub-band synthetic algorithms in time frequency domain. The effectiveness of this method is verified with the theoretical analysis and the computer-based simulations.

**Keywords:** SAR MIMO High Resolution Wide Swath (HRWS) Doppler ambiguities Sub-band synthetic technology in frequency domain

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