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地球同步轨道SAR曲线轨迹模型下的改进CS成像算法

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An Improved CS Imaging Algorithm for GEO SAR Based on Curve Trajectory Model

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摘要 地球同步轨道合成孔径雷达(GEO SAR)轨道高度高，合成孔径时间长，直线轨迹模型不再适用，导致常规的基于直线轨迹模型的成像算法性能下降。该文根据GEO SAR平台的运动特性，使用高阶逼近建立了曲线轨迹模型下的斜距方程，并结合级数反演法，推导了GEO SAR回波信号2维频谱高阶近似表达式。然后在此基础上提出了一种适用于GEO SAR曲线轨迹模型的改进Chirp Scaling(CS)成像算法。仿真结果表明该算法的斜距方程精度较高，能够精确校正距离徙动，实现全孔径高分辨成像。

关键词： 合成孔径雷达　同步轨道　Chirp Scaling(CS)　级数反演　2维频谱

Abstract： Because of the long integration time of Geosynchronous Earth Orbit Synthetic Aperture Radar (GEO SAR), the imaging algorithms based on linear trajectory module is not suit for GEO SAR, the imaging algorithms based on linear trajectory module may induce considerable distortion. Thus, this paper establishes the range equation of curve trajectory model by using the high order approximate based on the characters of the GEO SAR movements. Then, the two-dimensional spectrum is derived by the method of series reversion, based on which an improved Chirp Scaling (CS) imaging algorithm for GEO SAR based on curve trajectory model is presented. Simulation results show that the proposed range equation is more precise and the algorithm proposed is effective to correct the range-migration and to give high resolution imagery with the entire aperture.

Keywords： SAR　Geosynchronous orbits　Chirp Scaling (CS)　Series reversion　Two-dimensional spectrum

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