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传感器与信号处理

基于SPECAN处理的斜视SAR实时成像算法及其FPGA实现

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摘要:

斜视合成孔径雷达（synthetic aperture radar, SAR）成像具有广阔的应用前景。首先提出一种基于SPECAN算法的斜视SAR实时成像处理方法，具有运算量小、操作简单的特点。针对SPECAN处理带来的图像扇形畸变，提出采用Sinc插值校正方位采样间隔空变性的方法，实现图像扇形畸变的校正。在此基础上采用 FPGA （field programmable gate arrays, FPGA）实时编程实现，重点阐述基于“空域滤波”思想的Sinc插值模块设计。实测数据处理结果验证了该算法的有效性及FPGA实时实现的可行性。

关键词： 斜视SAR SPECAN算法 Sinc插值 实时成像 FPGA

Real-time imaging algorithm for squint SAR based on SPECAN processing and its implementation in FPGA

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Abstract:

Due to a wide application of squint synthetic aperture radar (SAR), a real-time imaging algorithm of squint SAR based on SPECAN processing is firstly presented, which is characterized by its small amount of computation and convenient operation. To cope with the sector distortion of SPECAN processing, a Sinc interpolation approach removing the varying of azimuth sampling grid distance is proposed. Based on the aforementioned, real-time programming of field programmable gate arrays (FPGA) implemented, emphasizing on the design of Sinc interpolation based on the spatial filtering approach. The good experimental images validate the effectiveness of this algorithm and the feasibility of implementation in FPGA.

Keywords: squint SAR SPECAN algorithm Sinc interpolation real-time imaging FPGA

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