论文

调频连续波(FMCW)聚束式SAR成像研究

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摘要：

针对调频连续波SAR与脉冲式SAR工作体制的不同，从而带来不同的回波表现形式，对基于调频连续波的聚束式SAR回波信号进行建模，分析信号的特征，揭示平台的连续运动在距离向产生一个多普勒频移的特性，从而影响方位聚焦．对于方位频谱混叠的问题，采用方位预滤波处理，通过插值实现采样率的提高，由于预滤波可以实现方位的块压缩，实际中的方位向点数并没有明显增加，最后基于FS算法完成残余聚焦，仿真数据处理结果验证了分析的正确性和算法的有效性．另外，对于平台连续运动引入的多普勒频移，分析了其对成像造成的影响，并给出了相应的补偿方法．

关键词：　调频连续波　聚束式SAR　方位预滤波

Imaging study of spotlight SAR using FMCW

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Abstract:

Based on the difference in working mode between Frequency Modulated Continuous Wave (FMCW) Synthetic Aperture Radar (SAR) and Pulse Synthetic Aperture Radar, which leads to a different form of the echo, this paper establishes the model of the Spotlight FMCW SAR receiving signal, analyzes its characteristics, and reveals the effect of Doppler frequency shift induced by the continuous motion in range direction while radar is transmitting and receiving signals, which affects azimuth focusing ultimately. For the problem of azimuth spectral folding, this paper adopts azimuth pre-filtering processing, which increases the sampling frequency through interpolation. Since azimuth pre-filtering can realize bulk azimuth data compression, the number of azimuth points does not increase significantly. Finally, based on the Frequency Scaling Algorithm, residual data focusing can be achieved. Point targets simulation verifies the analysis and validity of the algorithm. In addition, for the Doppler frequency shift induced by the continuous motion while radar is transmitting and receiving signals, we also analyze its effect on imaging and give the corresponding compensation method.

Keywords: FMCW   spotlight SAR   azimuth pre-filtering

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