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AN IMPROVED ALGORITHM FOR AZIMUTH FOURIER TRANSFORM IN GROUND  
OBSERVATION SAR IMAGING**Abstract**

Azimuth Fourier transform is one of the key processing steps in the SAR imaging process. This step requires the radar processing unit to complete the Fourier transform of the multiple echoes along the "Slow Time" in the specified observation period. During SAR imaging, this step will consume a lot of time. The consumption time is related to the observation range, the distance resolution and the points in azimuth Fourier transform. Obviously, the more points in the Fourier transform, the longer the time consumed. In the same range, the higher the distance resolution, the more azimuth Fourier transform is needed, and the processing time will be further increased. In this paper, an improved azimuth Fourier transform algorithm is proposed to improve the processing efficiency of azimuth Fourier transform and shorten the SAR imaging processing time. The conventional Fourier transform requires that the input sequence be a complete sequence, which must wait for all the data units in the input sequence to be completed. This paper presents an improved azimuth Fourier transform algorithm, by using the linear property of Fourier transform, an N-point Fourier transform is changed into the sum of N simple Fourier transform sequences, then combined with mapping look-up table method to reduce the time of simple Fourier transform, and finally improve the transformation efficiency of the whole sequence. This method can be used to preprocess the data unit in advance before the input sequence is completed. The Fourier transform results can be output immediately after the sequence is complete. This method will "fragment" the whole processing time of Fourier transform, make full use of the preparation process time of input sequence to complete the transformation work, and is suitable for Earth observation SAR processing system.