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Paper Title: An Efficient Image Recovery Algorithm for Diffraction Tomography Systems

Description: A diffraction tomography system has potential application in ultrasonic medical imaging area. It is capable of achieving imagery with the ultimate resolution of one quarter the wavelength by collecting ultrasonic backscattering data from a circular array of sensors and reconstructing the object reflectivity using a digital image recovery algorithm performed by a computer. One advantage of such a system is that it allows a relatively lower frequency wave to penetrate more deeply into the object and still achieve imagery with a reasonable resolution.

An efficient image recovery algorithm for the diffraction tomography system was originally developed for processing a wide beam spaceborne SAR data. The algorithm presented here makes use of an exact 2-1) spectrum of a point target (Jin, 1992) in a range Doppler like processing approach. It updates its reference functions as frequent as required using a special process - that generates kernels from which reference functions can be derived efficiently. Compared to a previously devised algorithm (Norton, 1980), this new algorithm is about ten to twenty times more efficient since this algorithm makes full use of the Fast Fourier Transform while the previous one requires the use of a less efficient quasi-fast Hankel transform.

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