

Abstract Submitted
for the OSF12 Meeting of
The American Physical Society

Tomographic Reconstruction of Breast Characteristics Using Transmitted Ultrasound Signals GURSHARAN SANDHU, Wayne State University, CUIPING LI, NEB DURIC, Karmanos Cancer Institute, ZHI-FENG HUANG, Wayne State University — X-ray Mammography has been the standard technique for the detection of breast cancer. However, it uses ionizing radiation, and can cause severe discomfort. It also has low spatial resolution, and can be prone to misdiagnosis. Techniques such as X-ray CT and MRI alleviate some of these issues but are costly. Researchers at Karmanos Cancer Institute developed a tomographic ultrasound device which is able to reconstruct the reflectivity, attenuation, and sound speed characteristics of the breast. A patient places her breast into a ring array of transducers immersed in a water bath, and the device scanning the breast yields a 3d reconstruction. Our work focuses on improving algorithms for attenuation and sound speed imaging. Current time-of-flight tomography provides relatively low resolution images. Improvements are made by considering diffraction effects with the use of the low resolution image as a seed to the Born approximation. Ultimately, full waveform inversion will be used to obtain images with resolution comparable to MRI.

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Date submitted: 03 Sep 2012

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