

Guided Wave Tomography

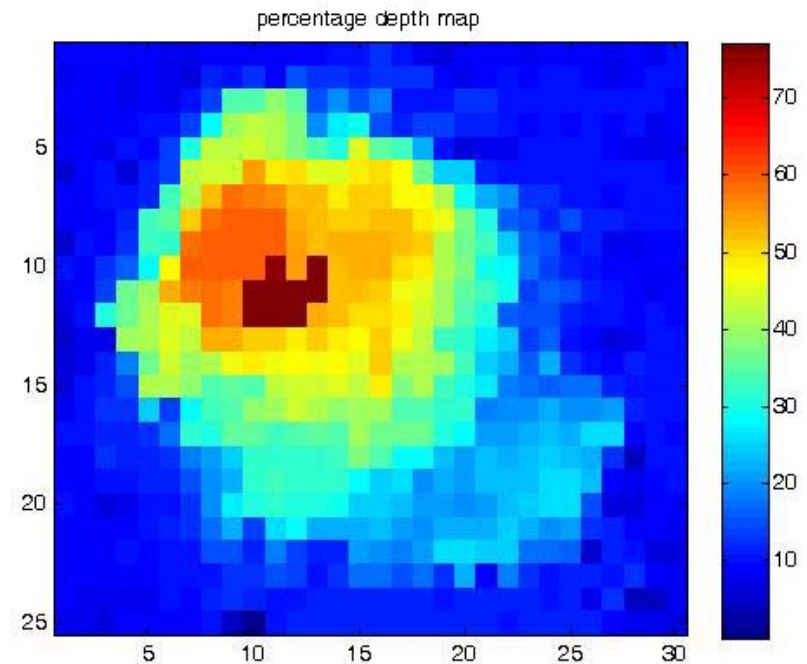
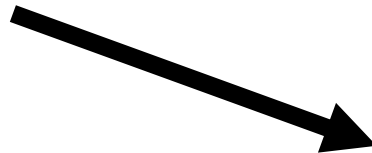
Remo Ribichini, Peter Huthwaite
Francesco Simonetti and Peter Cawley

Current Guided Wave Techniques For Pipe Inspection:

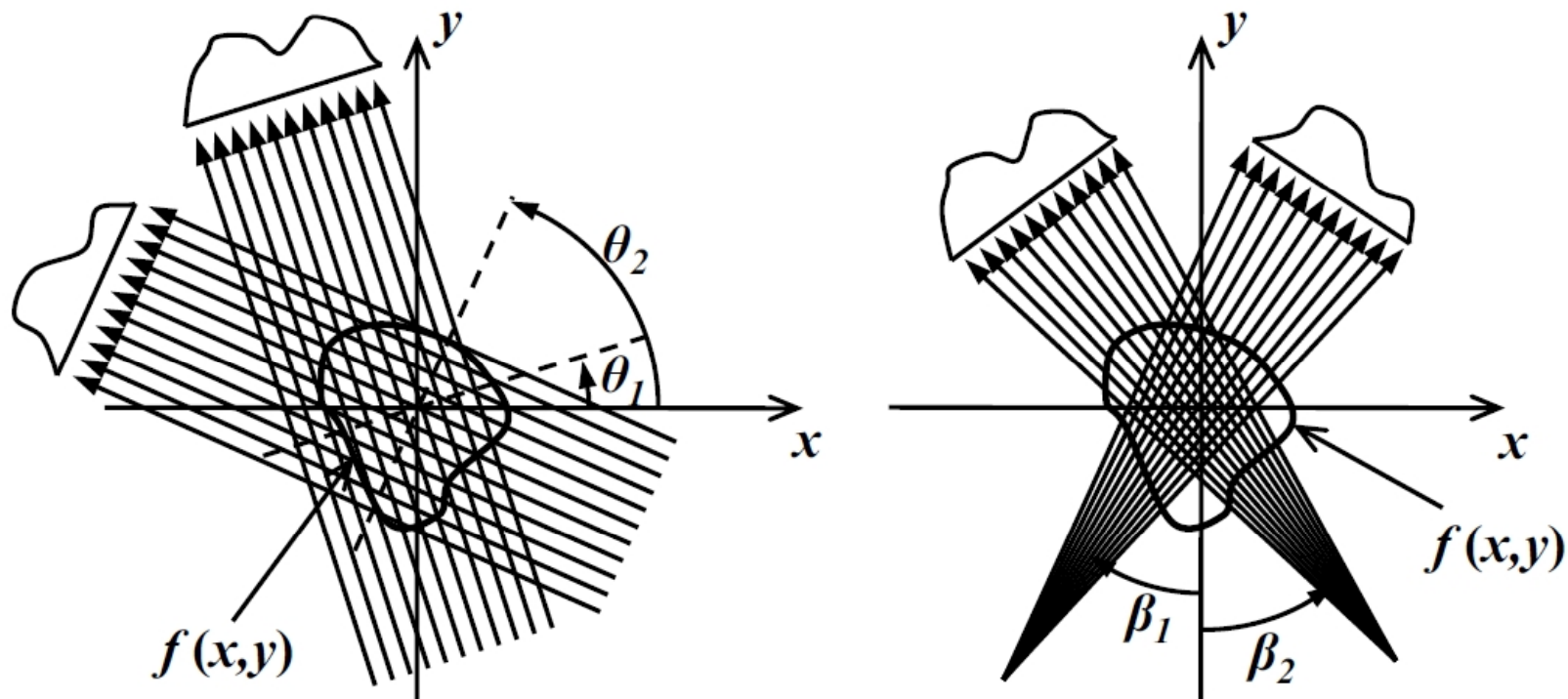
- Allow Defect Detection (axial and circumferential position)
- Allow Defect Size Estimation

Further Goal:

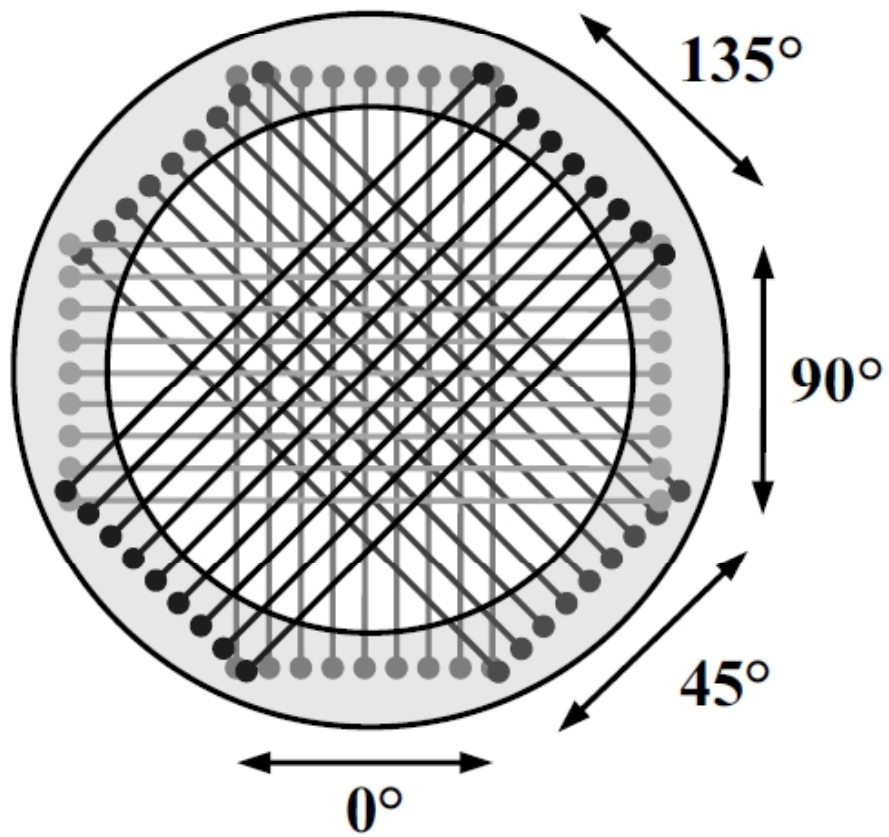
- Mapping of Corrosion Under Supports



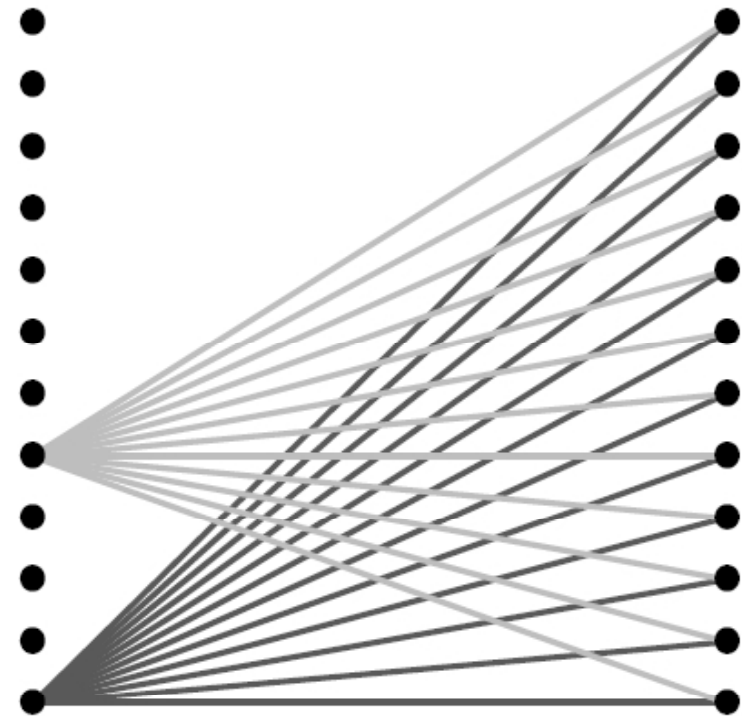
Tomography

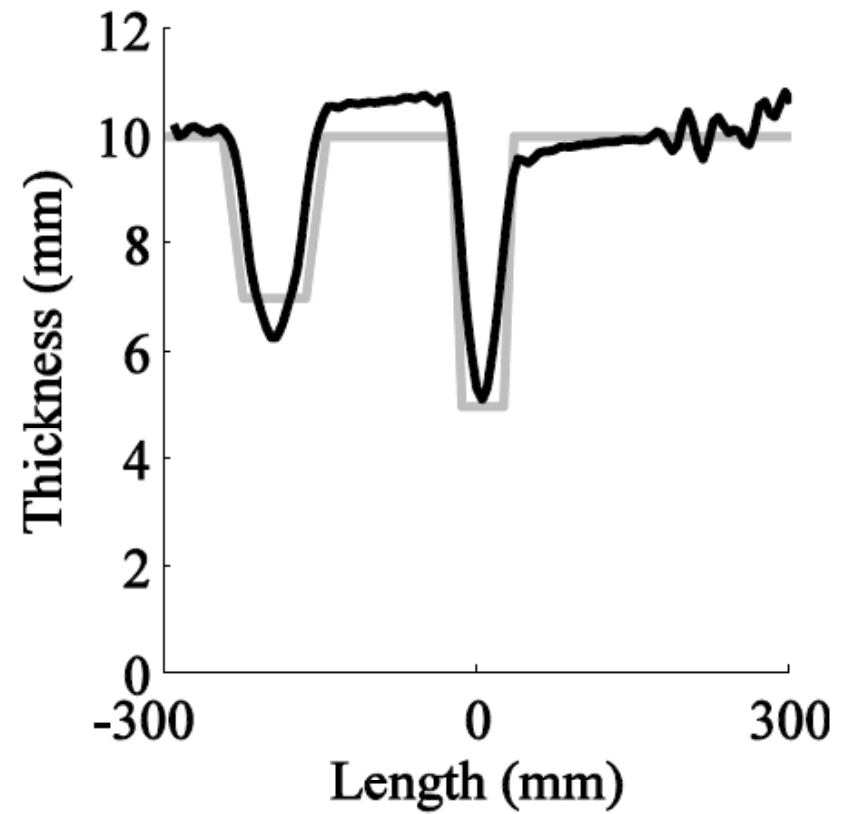
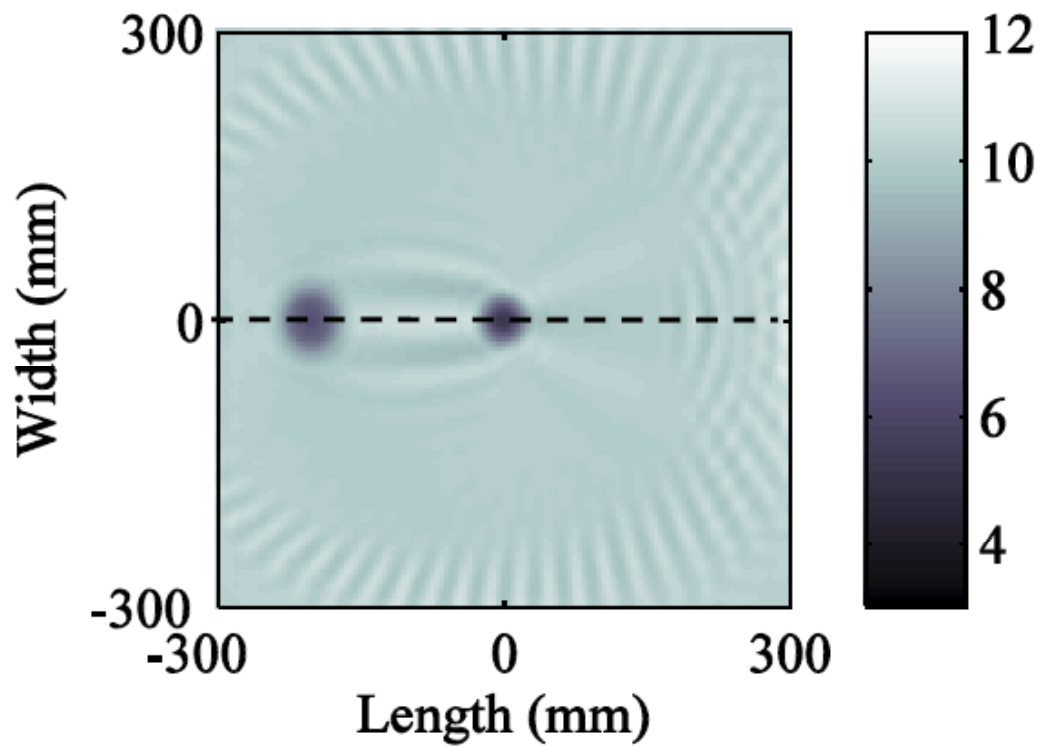


Full-View

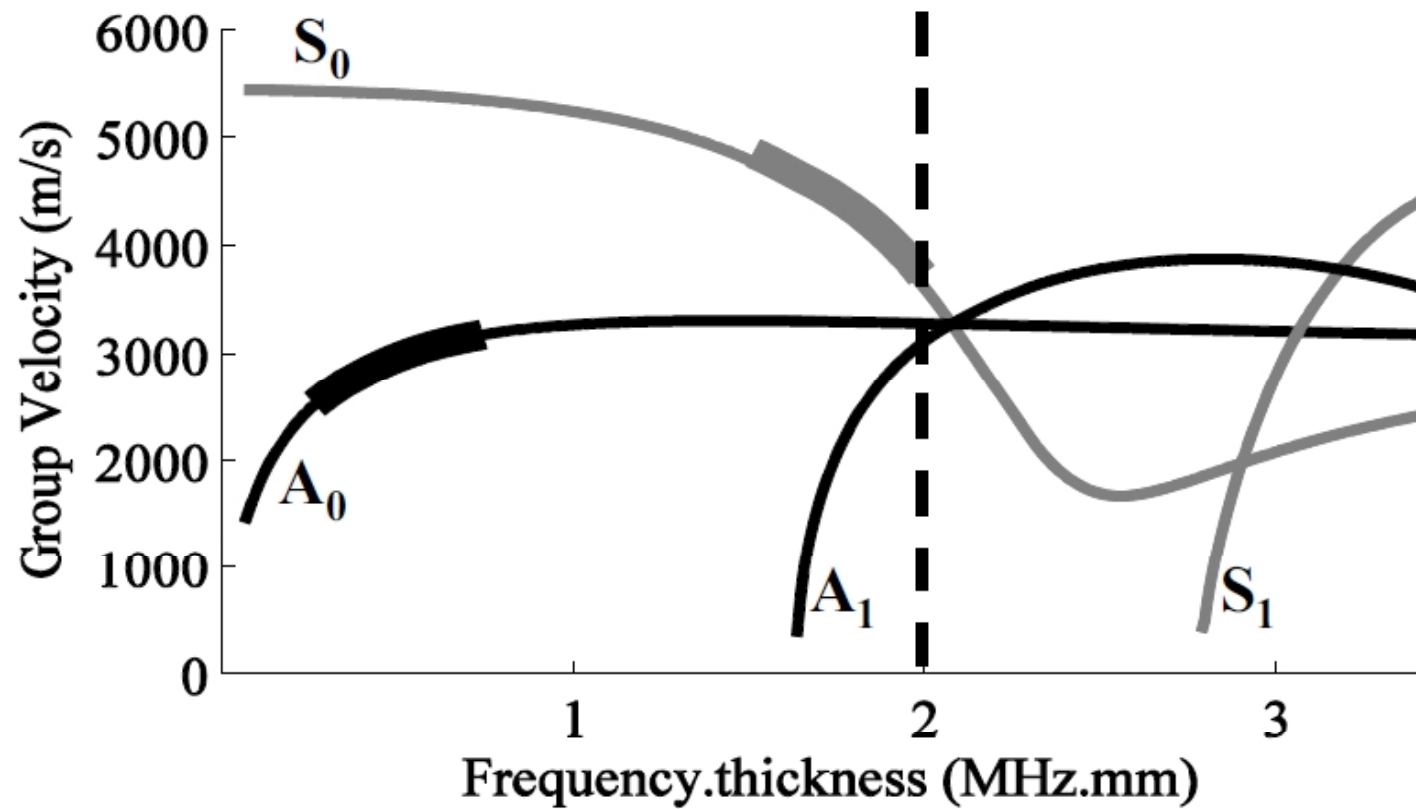


Cross-Hole





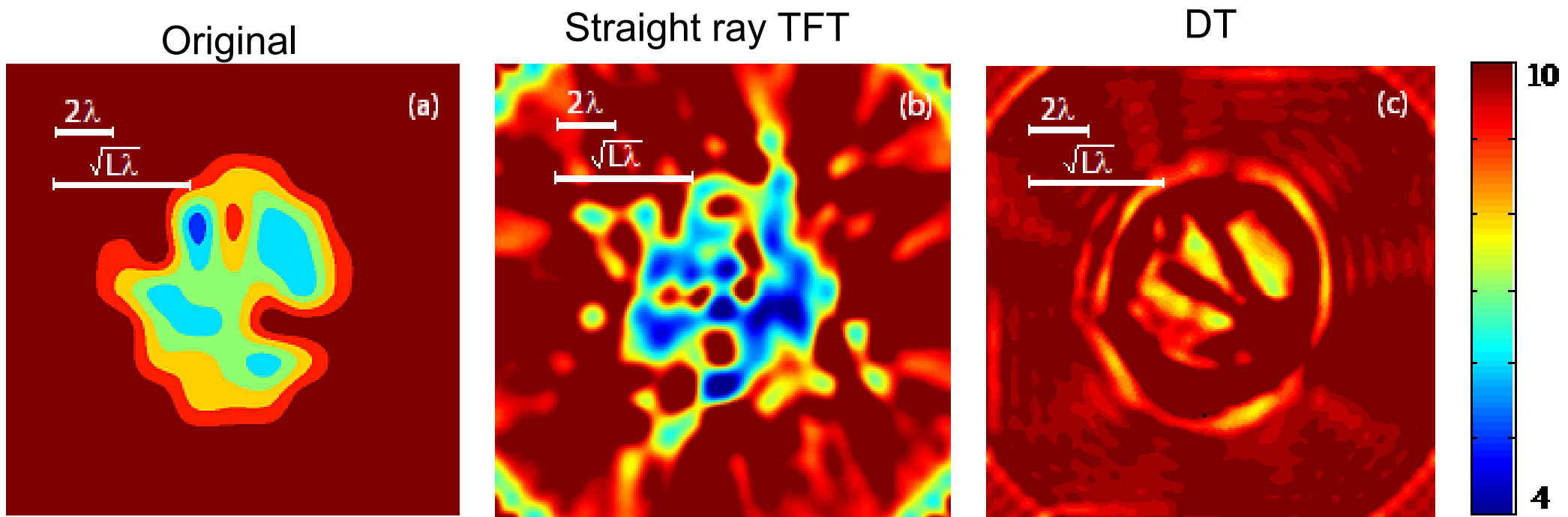
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Two Main Tomography Techniques:

- Time of Flight Tomography (TFT) \longrightarrow Ray Approximation $d \gg \lambda$
- Diffraction Tomography (DT) \longrightarrow $d \sim \lambda$

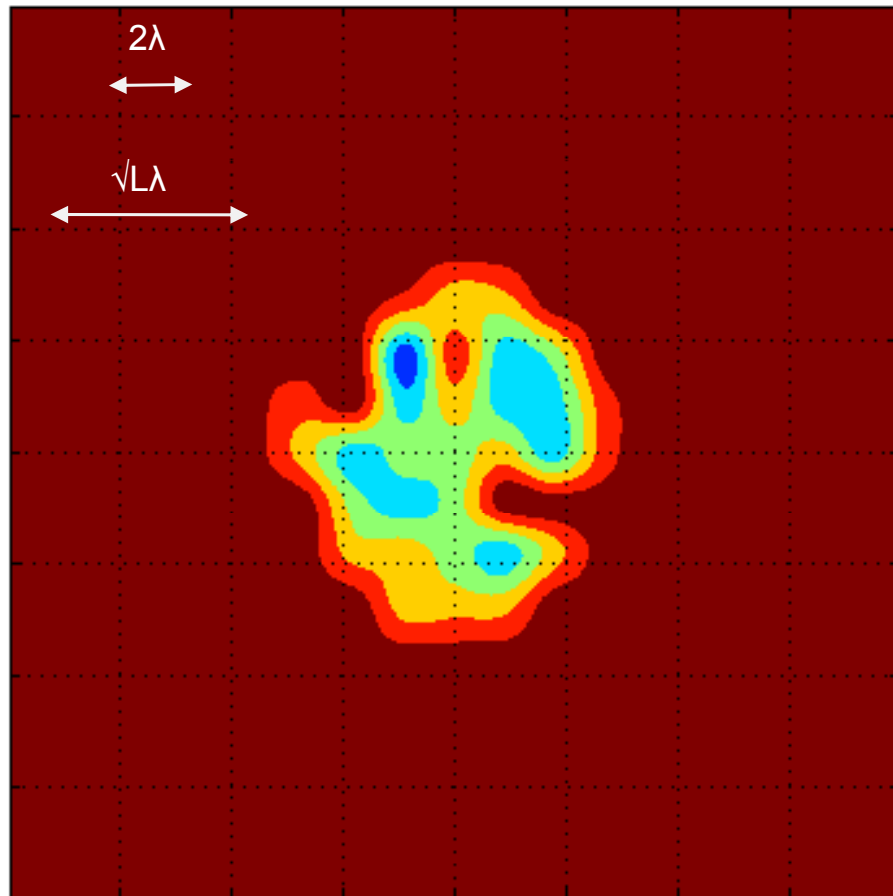
Previous Results



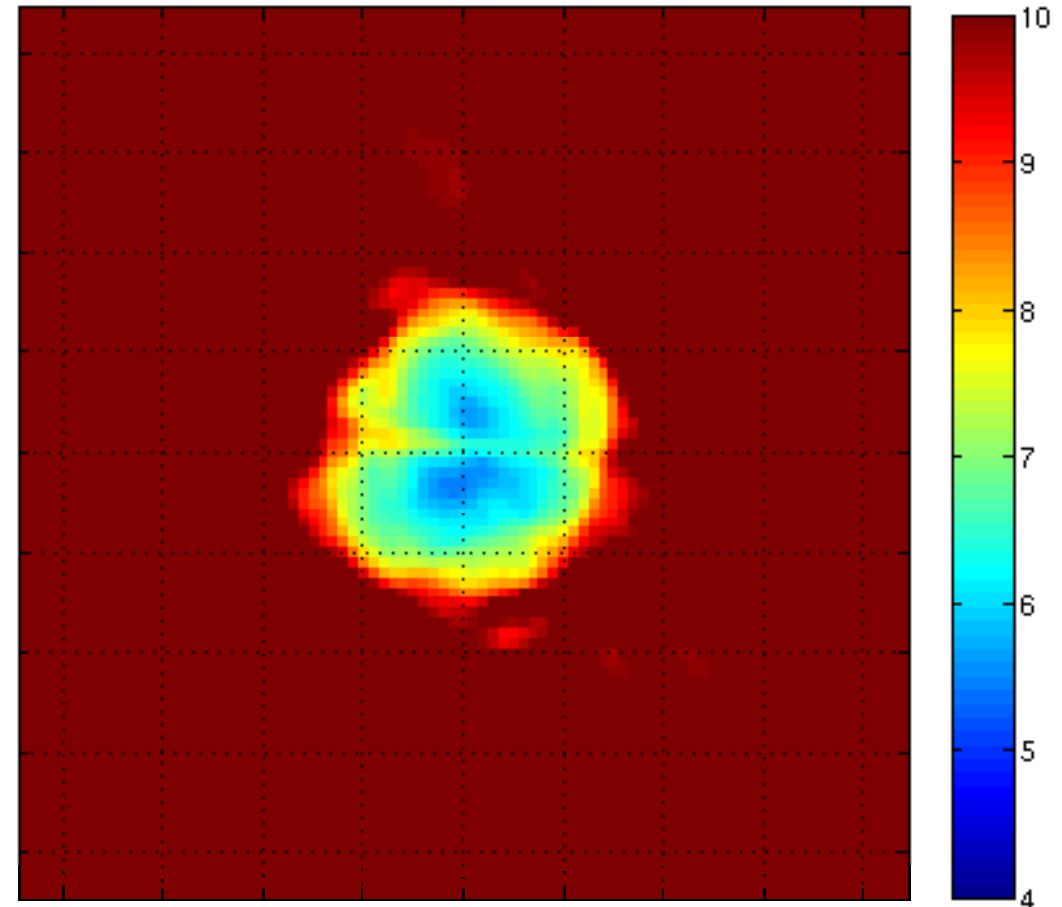
Circular array with 128 transducers. 10mm thickness aluminium plate
 $f=50\text{kHz}$ $\lambda=38\text{mm}$

TFT with dispersion

Original



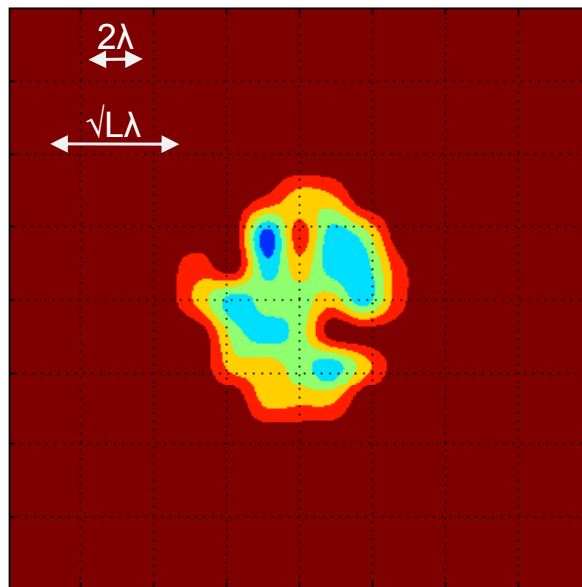
Thickness from TFT group velocity



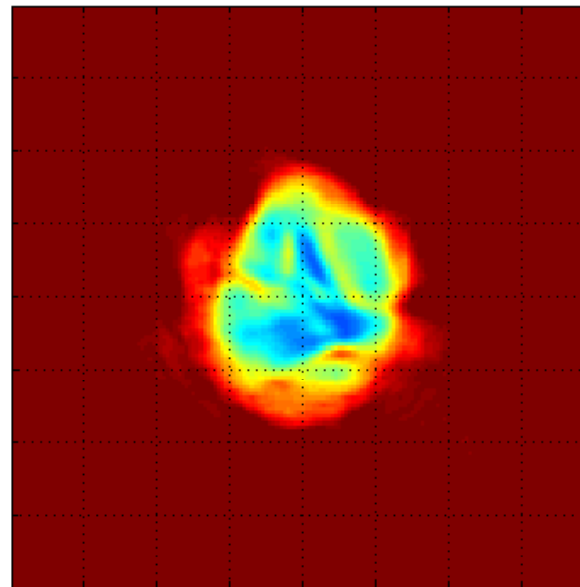
HARBUT

(Hybrid Algorithm for Robust Breast Ultrasound Tomography)

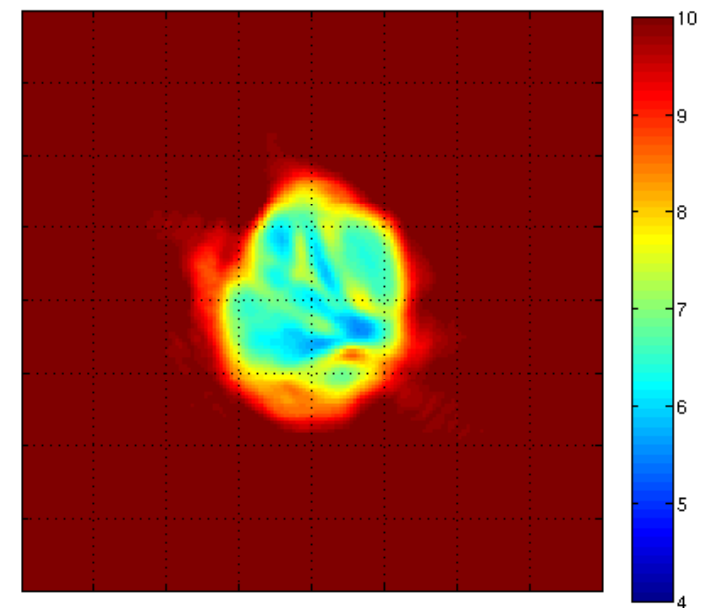
Original



HARBUT 1st it

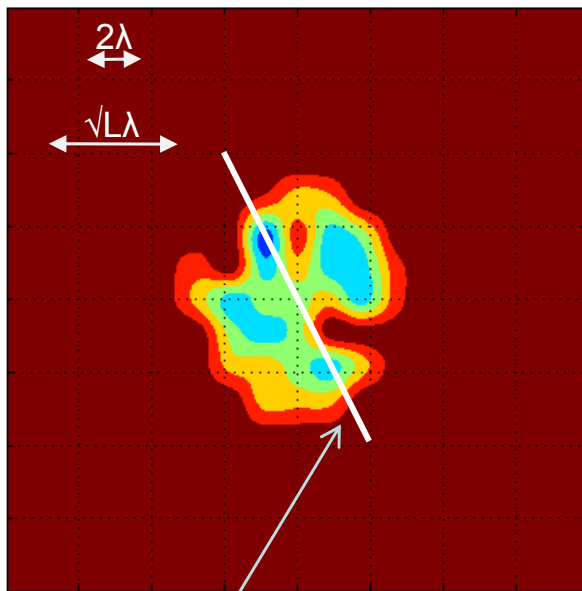


HARBUT 2nd it

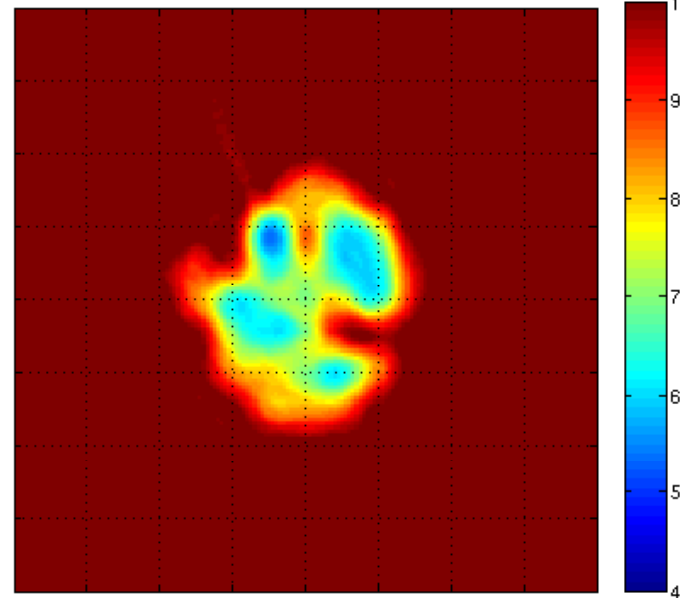


Many HARBUT iterations

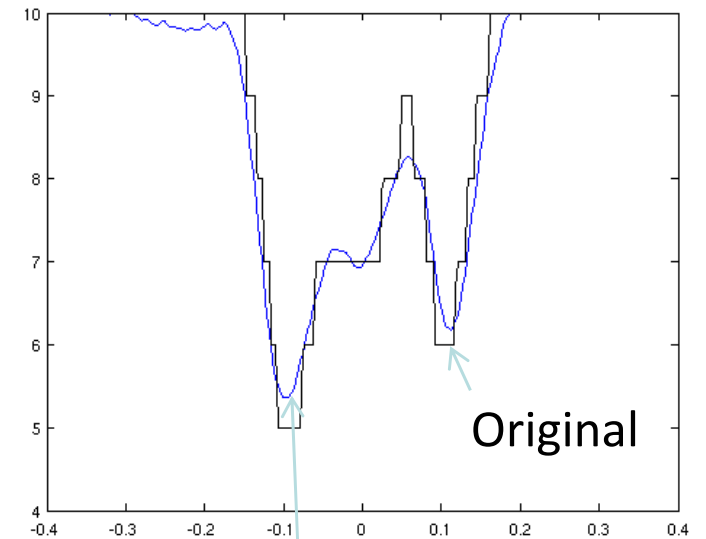
Original



HARBUT 11 its



Cross section



HARBUT reconstruction

Cross section on this line

First Trial

