

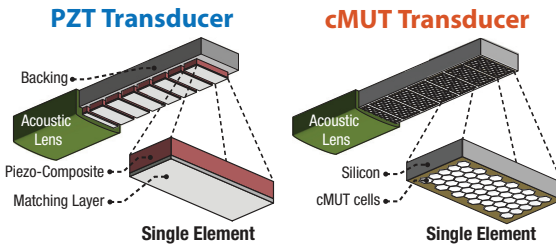
BROADBAND OPTOACOUSTIC CHARACTERIZATION OF cMUT AND PZT TRANSDUCER DIRECTIVITY IN RECEIVE MODE

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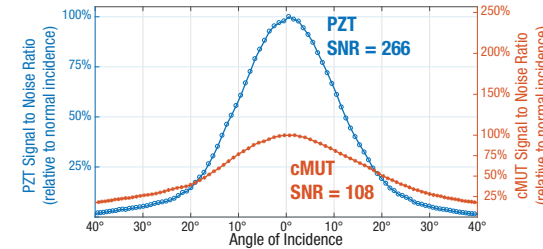
Medical ultrasound transducers are used in clinical and pre-clinical imaging.

Medical ultrasound transducers are widely used in **optoacoustic tomography** and **pulse-echo ultrasound** imaging [1,2]. Ultrasound transducers need to be characterized in order to select the transducer that provides the best images. Typically, transducers with a high bandwidth, a high central frequency and a larger number of elements are preferred, which makes their characterization challenging.

Ultrasound Transducer Technologies



Results cMUT and PZT characterization



The **PZT transducer** shows a better absolute sensitivity at normal incidence.

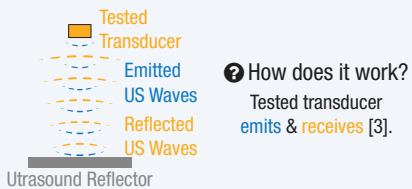
Take Home Messages

- Optoacoustic characterization of large ultrasound transducer arrays is fast, simple and flexible.
- The cMUT transducer showed a higher angular sensitivity compared to the PZT transducer.
- Medical ultrasound arrays have to be carefully characterized to select the best transducer.

How are ultrasound transducers typically characterized?

Self-Reciprocity

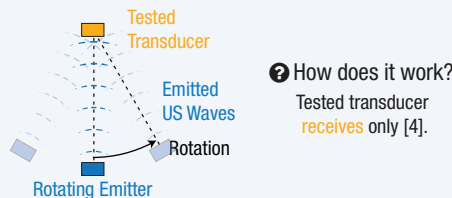
- simple, fast & no additional equipment
- sensitivity only measured at normal incidence, no directivity



How does it work?
Tested transducer emits & receives [3].

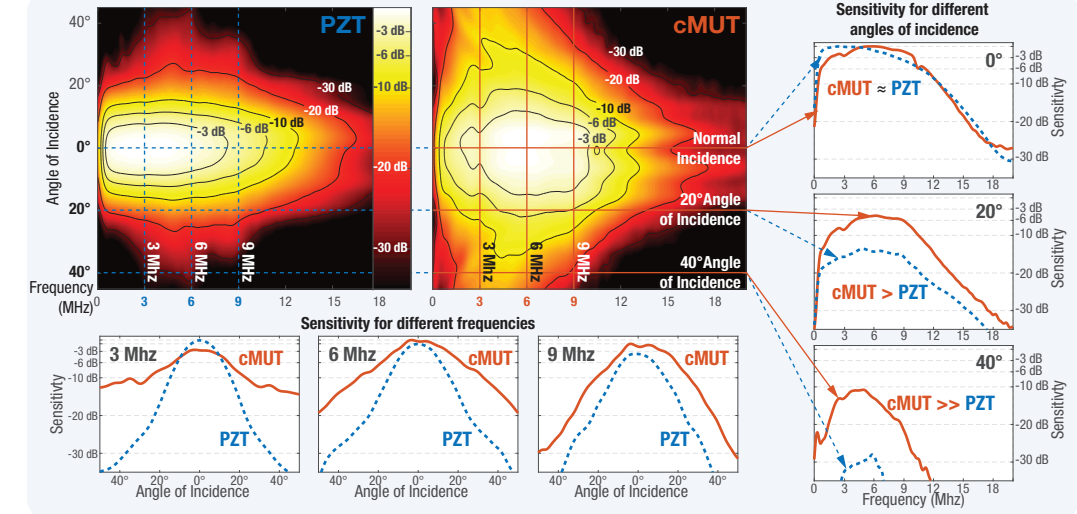
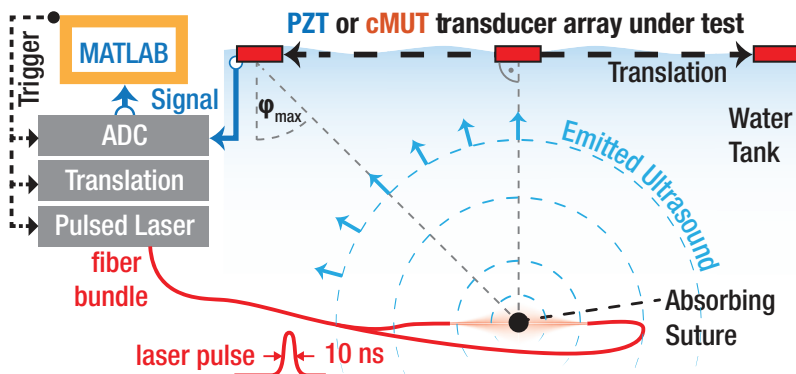
Transmit-Receive

- sensitivity measured as function of angle and frequency (directivity)
- slow, requires additional equipment



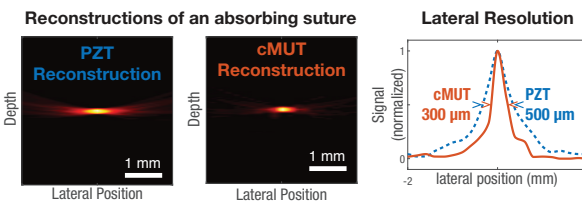
How does it work?
Tested transducer receives only [4].

Methods - Transducer characterization using the optoacoustic effect.



The **cMUT transducer** shows a better angular sensitivity over a wider frequency range.

A better angular sensitivity reduces limited view artifacts in tomographic optoacoustic reconstructions [6], resulting in **more accurate images!**



Acknowledgments

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