Diplom- / Studien- / Masterarbeit Ultraschallmesstechnik

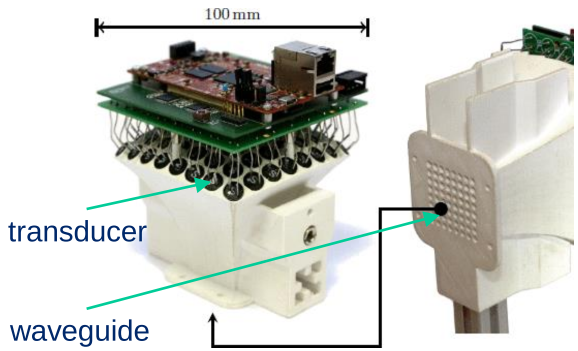
Implementation and evaluation of an ultrasound array with waveguides in foam

Motivation

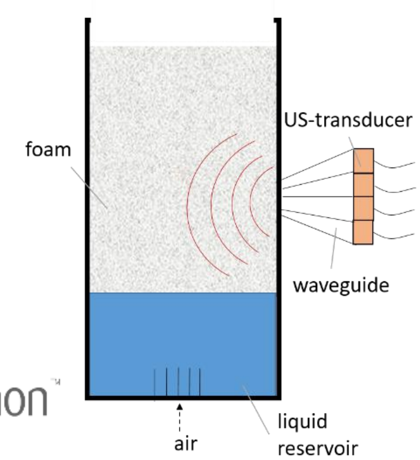
Gathering in situ information from foams is a persistent challenge. Containing multiple phases, the dispersion often attenuates the measurement signal to extinction. Ultrasound in the low Kilohertz range (50…200 kHz) is subject to less attenuation and might enable a control loop for processes as flotation, to enhance the retrieval of resources.

To achieve a high spatial and temporal resolution an array with a transducer element pitch of λ/2 is necessary. Being limited by the possibility of producing transducers in the low frequency range with those small dimensions, a waveguide can overcome this problem und guide the ultrasound into a smaller output. A resulting plane wave minimizes the side lobes and opens up a completely new data processing possibility. Using e.g. *time reversal imaging* might thus enhance the in situ information in foam.

Therefore an ultrasound-waveguide is to be designed and build, that allows the excitation of a plane wave.



A. Jäger *et al*., "Air-coupled 40-KHZ ultrasonic 2D-phased array based on a 3D-printed waveguide structure," 2017.



Tasks

- Familiarization with the ultrasound measurement system and scientific Python
- Design and implementation of an ultrasound waveguide
- Characterization of ultrasound measurement

Keywords

Python, Waveguide, Signal Processing, Beam Forming, Froth

Contact

- Hannes Emmerich, BAR I56E, Tel. +49 351 463-35282
- E-Mail: hannes.emmerich@tu-dresden.de

TECHNISCHE UNIVERSITÄT DRESDEN

MST

Professur für Mess- und Sensorsystemtechnik