RUHR-UNIVERSITÄT BOCHUM

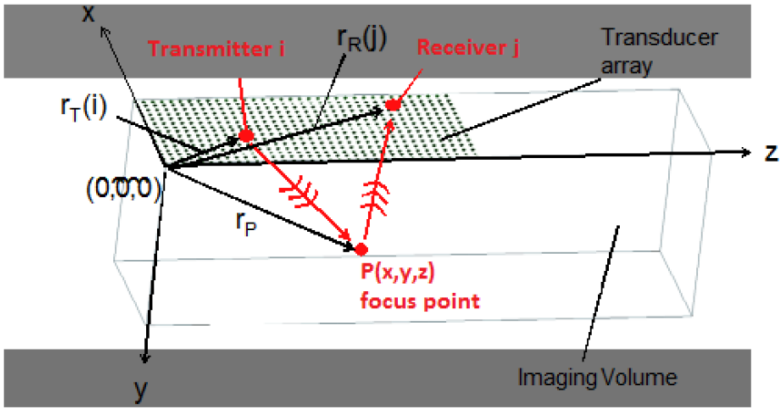
RUB

MASTER THESIS

IMAGING OF INTERNAL FLAWS IN MATERIAL USING SYNTHETIC APERTURE FOCUSING TECHNIQUE (SAFT)

DESCRIPTION:

This thesis work aims to apply the SAFT for imaging the internal flaws in materials. The simple idea of SAFT is illustrated in the figure below, arrival times from transmitter-receiver pairs are the key components used to construct the image intensities which indicate internal flaw reflecting objects (See [1] for further details). This technique can be used very effectively to detect internal defect in structure of different materials such as metallic rail [1] and concrete block [2]. In the frame of this thesis, an efficient SAFT will be implemented. In addition, a finite element model for elastic wave propagation will be created with Abaqus to generate data for validation of the SAFT.



Principle of SAFT for ultrasonic tomography [1]

BACKGROUND:

Elastodynamics, finite element analysis, programing: Matlab or Python.

REFERENCE:

[1] Phillips et al. (2014). Ultrasonic Tomography for Rail Flaw Imaging. In 2014 Joint Rail Conference. American Society of Mechanical Engineers.

[2] Wang et al. (2015). Numerical and experimental study on multi-directional SAFT to detect defects inside plain or reinforced concrete. Construction and Building Materials, 76, 351-359.

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