

## Bachelor Thesis / Case Study

### Topic: Investigation of Ultrasonic Guided Wave-based methods in SHM systems

#### DESCRIPTION:

Structural health monitoring (SHM) systems are increasingly being considered as a viable next step in non-destructive testing for the various types of structures. SHM systems provide a real-time integrity of the structure that makes the transformation from schedule-based maintenance to condition-based maintenance possible. Implementation of SHM systems for real structures depends largely on the effectiveness and cost efficiency of them. Hence, optimizing the implemented algorithms plays an important role in accuracy of SHM systems.

SHM methods generally can be divided into two main group of algorithms: Ultrasonic Guided Wave-based (UGW) methods and vibration-based ones. The detection of the damage in UGW-based methods rests on identification of the reflected wave from the crack or delamination in the structure.

In the present work, several UGW-based methods need to be studied and the performance and the capabilities as well as the drawback of them must be compared. Delay and Sum algorithm (an UGW-based method) should be particularly implemented. Furthermore, the effectiveness and performance of the method facing different scenarios should be assessed. The data required for the algorithm needs to be obtained by means of experimental measurements and numerical simulations.

#### REQUIREMENTS:

Good knowledge of MATLAB.  
Interest in experimental work.  
Basic knowledge of Abaqus.

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