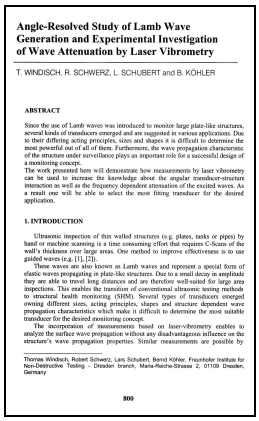
Angle-Resolved Study of Lamb Wave Generation and Experimental Investigation of Wave Attenuation by Laser Vibrometry

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ABSTRACT

Since the use of Lamb waves was introduced to monitor large plate-like structures, several kinds of transducers emerged and are suggested in various applications. Due to their differing acting principles, sizes and shapes it is difficult to determine the most powerful out of all of them. Furthermore, the wave propagation characteristic of the structure under surveillance plays an important role for a successful design of a monitoring concept.
The work presented here will demonstrate how measurements by laser vibrometry can be used to increase the knowledge about the angular transducer-structure interaction as well as the frequency dependent attenuation of the excited waves. As a result one will be able to select the most fitting transducer for the desired application.

1. INTRODUCTION

Ultrasonic inspection of thin walled structures (e.g. plates, tanks or pipes) by hand or machine scanning is a time consuming effort that requires C-Scans of the wall's thickness over large areas. One method to improve effectiveness is to use guided waves (e.g. [1], [2]).
These waves are also known as Lamb waves and represent a special form of elastic waves propagating in plate-like structures. Due to a small decay in amplitude they are able to travel long distances and are therefore well-suited for large area inspections. This enables the transition of conventional ultrasonic testing methods to structural health monitoring (SHM). Several types of transducers emerged owning different sizes, acting principles, shapes and structure dependent wave propagation characteristics which make it difficult to determine the most suitable transducer for the desired monitoring concept.
The incorporation of measurements based on laser-vibrometry enables to analyze the surface wave propagation without any disadvantageous influence on the structure's wave propagation properties. Similar measurements are possible by

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800

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Ключевые слова:

Содержание.