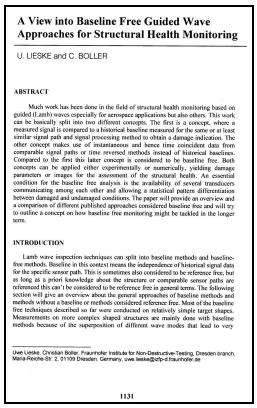
A View into Baseline Free Guided Wave Approaches for Structural Health Monitoring

U. LIESKE and C. BOLLER

ABSTRACT

Much work has been done in the field of structural health monitoring based on guided (Lamb) waves especially for aerospace applications but also others. This work can be basically split into two different concepts. The first is a concept, where a measured signal is compared to a historical baseline measured for the same or at least similar signal path and signal processing method to obtain a damage indication. The other concept makes use of instantaneous and hence time coincident data from comparable signal paths or time reversed methods instead of historical baselines. Compared to the first this latter concept is considered to be baseline free. Both concepts can be applied either experimentally or numerically, yielding damage parameters or images for the assessment of the structural health. An essential condition for the baseline free analysis is the availability of several transducers communicating among each other and allowing a statistical pattern differentiation between damaged and undamaged conditions. The paper will provide an overview and a comparison of different published approaches considered baseline free and will try to outline a concept on how baseline free monitoring might be tackled in the longer term.

INTRODUCTION

Lamb wave inspection techniques can split into baseline methods and baseline-free methods. Baseline in this context means the independence of historical signal data for the specific sensor path. This is sometimes also considered to be reference free, but as long as a priori knowledge about the structure or comparable sensor paths are referenced this can't be considered to be reference free in general terms. The following section will give an overview about the general approaches of baseline methods and methods without a baseline or methods considered reference free. Most of the baseline free techniques described so far were conducted on relatively simple target shapes. Measurements on more complex shaped structures are mainly done with baseline methods because of the superposition of different wave modes that lead to very

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Ключевые слова:

Содержание.