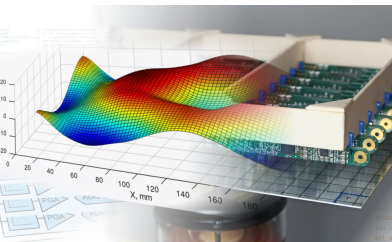


Acoustic Vibrational Mode Tracking - AVMT

This invention measures vibrations on surfaces and makes them visible. It is ideal for non-destructive testing of components or for analyzing the oscillation properties of components or even musical instruments. Until now, a two-dimensional measurement has only been possible using extremely complex and expensive methods. The present innovation uses simple audio components and still offers high accuracy and comprehensible graphical evaluations.



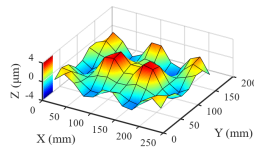
Vibrations become visible and understandable

The measuring device enables vibration analyses of complex solids and offers a cost-effective and non-destructive possibility for quality monitoring and component testing. The simple visualization of the "out-of-the-plane" motion on the component surface is provided in a user-friendly map display.

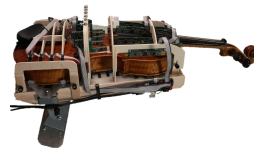
- 01 Simultaneous capturing of vibration in multiple points of a surface drastically reducing the measurement time.
- 02 Complex inspection tasks or non-destructive in-line quality testing.
- 03 Very cost-effective hardware - standard MEMS microphones with a simple calibration process.
- 04 Real-time visualization of vibration patterns.

REFERENCES:

- Detailed Video Description
- Click for demo video



The standing wave of the natural vibration of a metal plate gets visualized over the entire surface: Elevations appear red, depressions blue.



Visualizing sound: Even the characteristics of complex instruments such as this violin can be analyzed.

IP RIGHTS

European
Application
filed

2021

CHALLENGE

The two-dimensional measurement of vibrations on components is complex. Laser vibrometers measure only in the focal point of a laser beam. The measurement of a planar surface vibration can only be performed using several measuring heads or via scanning processes. Acceleration sensors only allow point measurements and influence the vibration behavior due to their own weight, since they sit on the object to be measured.

INNOVATION

A planar vibration analysis, especially of non-repetitive events, is difficult to display with conventional measurement technology. The patent-pending system uses the speed of sound to calculate a two-dimensional dataset of the sound wave propagation in a vibrating component or in a group of components. The measurement is carried out with the aid of microphone pairs. These record the sound velocity and accurately calculate the geometric deflection of the vibrating surface based on their position. Reliable measurement of large-scale components seems possible.

01 Basic principles observed · 02 Technology concept formulated · 03 Experimental proof of concept · 04 Technology validated in lab · 05 Technology validated in relevant environment · 06 Technology demonstrated in relevant environment · 07 System prototype demonstrated in operational environment · 08 System complete and qualified

TRL 08

TRL 07

TRL 06

TRL 05

TRL 04

TRL 03

TRL 02

TRL 01

Technology Readiness Level (TRL)



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