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Title:

Making modal analysis easy and more reliable – Reference points identification by experimental prestudy

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Abstract:

Though modal analysis is a common tool to evaluate the dynamic properties of a structure, there are still many individual decisions to be made during the process which are often based on experience and make it difficult for occasional users to gain reliable and correct results. One of those experience-based choices is the correct number and placement of reference points. This decision is especially important, because it must be made right in the beginning of the process and a wrong choice is only noticeable in the very end of the process. Picking the wrong reference points could result in incomplete modal analysis outcomes, as it might make certain modes undetectable, compounded by the user's lack of awareness about these missing modes.

In the paper an innovative approach will be presented to choose the minimal number of mandatory reference points and their placement. While other approaches use results of numerical simulations or rely on a visual evaluation of measurement data by the user, the presented approach is based on a few simple measurements and works automatically without any further user-interaction. In addition to traditional methods such as the Least-Squares Complex Frequency-domain (LSCF) estimator the presented approach takes advantage of a Neural Network to make user-interaction redundant.

The advantage of the presented approach will be shown based on the example of a real structure under test.

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