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Reliability of Vibration-based Nondestructive Inspection Methods for Damage Detection in Structural Engineering

The work presents a model-based strategy to investigate the reliability of an inspection method for damage detection considering model quality aspects. The developed strategy is a probabilistic framework which combines several methods and approaches, such as sensitivity analysis, model updating, etc. The developed framework was applied to evaluate the performance of a chosen vibration-based inspection method for damage detection. The reliability is assessed using the probability of detecting the predefined target damage size associated with a chosen probability of false alarm. The results show that the reliability of the inspection method depends on the studied damage scenario and location, number and location of the sensors, excitation properties, input parameters, and measurement uncertainty.

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