Comparative Assessment On Measurement And Modeling Errors In Operational Modal Analysis

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In Operational modal analysis (OMA) procedures, some challenging issues might be confronted during the instrumentation and data acquisition. These issues can extremely affect the quality of identified modal parameters, including modal frequency, damping ratio, and mode shape vector. One kind of these sources can be attributed as sensor noise sensitivity which may adversely affect the frequency dependent resolution of the measured response and result in poor estimates for modal parameters. Such kinds of errors are caused by the instrumentation and data acquisition process, and therefore they are referred to as measurement errors in the literature. Additionally, distortions in the fundamental mathematical assumptions of implemented OMA technique (e.g. small damping ratio, stationary input data, and well separated modes) may also produce large errors in addition to measurement errors. These are classified as modeling errors on the quality of modal parameters is investigated comparatively based on several output-only modal identification techniques. In this aspect, variations in the parameter estimation quality to concerning the implementation are discussed considering some extreme effects, such as non-classical damping and non-stationary input.