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Validation of a Hybrid Automated Modal Identification Algorithm for Structural Health Monitoring Applications

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In recent years a growing interest in systems and techniques for fast damage detection based on vibration analysis has raised. Modal-based damage detection algorithms are well-known techniques for structural health assessment. The development of several automated output-only modal identification procedures in the last few years has led to a renewed interest in such techniques. However, robustness of the automated modal identification algorithms towards slightly non-stationary excitation, computational effort and reliability of modal parameter and, in particular, damping estimates still represent not definitely solved issues.

In this paper, starting from the lessons learned about the performance of popular operational modal analysis techniques, a hybrid algorithm for automated output-only modal parameter estimation for structural health monitoring purposes is proposed. It has been obtained from different modal identification algorithms through a hybridization process and, as such, some issues concerning the interpretation of stabilization diagrams are overcome. The main advantages of the novel technique are represented by the possibility to control the computational time and to obtain also reliable and very accurate damping estimates.

Performance of the proposed procedure are assessed through its application to simulated and real measurements. Results confirm the robustness and accuracy of the algorithm, which can be certainly employed to monitor the modal parameters of large civil structures such as bridges and tall buildings.

Ключевые слова:

Содержание.

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