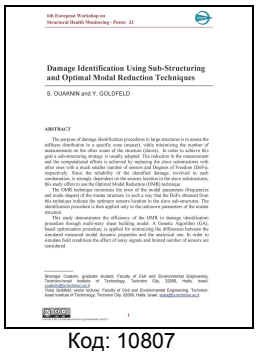

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Damage Identification Using Sub-Structuring and Optimal Modal Reduction Techniques

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The purpose of damage identification procedures in large structures is to assess the stiffness distribution in a specific zone (master), while minimizing the number of measurements on the other zones of the structure (slaves). In order to achieve this goal a sub-structuring strategy is usually adopted. The reduction in the measurement and the computational efforts is achieved by replacing the slave substructures with other ones with a much smaller number of sensors and Degrees of Freedom (DoFs), respectively. Since the reliability of the identified damage, involved in such condensation, is strongly dependent on the sensors location in the slave substructures, this study offers to use the Optimal Modal Reduction (OMR) technique

The OMR technique minimizes the error of the modal parameters (frequencies and mode shapes) of the master structure, in such a way that the DoFs obtained from this technique indicate the optimum sensors location in the slave sub-structures. The identification procedure is then applied only to the unknown parameters of the master structure.

This study demonstrates the efficiency of the OMR in damage identification procedure through multi-story shear building model. A Genetic Algorithm (GA), based optimization procedure, is applied for minimizing the differences between the simulated measured modal dynamic properties and the analytical one. In order to simulate field conditions the effect of noisy signals and limited number of sensors are considered.

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Ключевые слова:

Содержание