Structural Health Monitoring and Damage Structural Identification Using Dynamic Response

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Abstract : Monitoring the structural health and diagnosing their damage in the early stages has always been one of the topics of concern. Nowadays, research on structural damage detection methods based on vibration analysis is very extensive. Moreover, these methods can be used as methods of permanent and timely inspection of structures and prevent further damage to structures. Non-destructive methods are the low-cost and economical methods for determining the damage of structures. In this research, a non-destructive method for detecting and identifying the failure location in structures based on dynamic responses resulting from time history analysis is proposed. When the structure is damaged due to the reduction of stiffness, and due to the applied loads, the displacements in different parts of the structure were increased. In the proposed method, the damage position is determined based on the calculation of the strain energy difference in each member of the damaged structure and the healthy structure at any time. Defective members of the structure are indicated by the amount of strain energy relative to the healthy state. The results indicated that the proper accuracy and performance of the proposed method for identifying failure in structures.

Keywords : failure, time history analysis, dynamic response, strain energy

Conference Title : ICCEIM 2021 : International Conference on Construction, Engineering and Infrastructure Management

Conference Location : Paris, France

Conference Dates : May 17-18, 2021