World Academy of Science, Engineering and Technology
International Journal of Civil and Architectural Engineering
Vol:16, No:08, 2022

Damage Identification Using Experimental Modal Analysis

Authors : Niladri Sekhar Barma, Satish Dhandole

Abstract : Damage identification in the context of safety, nowadays, has become a fundamental research interest area in the field of mechanical, civil, and aerospace engineering structures. The following research is aimed to identify damage in a mechanical beam structure and quantify the severity or extent of damage in terms of loss of stiffness, and obtain an updated analytical Finite Element (FE) model. An FE model is used for analysis, and the location of damage for single and multiple damage cases is identified numerically using the modal strain energy method and mode shape curvature method. Experimental data has been acquired with the help of an accelerometer. Fast Fourier Transform (FFT) algorithm is applied to the measured signal, and subsequently, post-processing is done in MEscopeVes software. The two sets of data, the numerical FE model and experimental results, are compared to locate the damage accurately. The extent of the damage is identified via modal frequencies using a mixed numerical-experimental technique. Mode shape comparison is performed by Modal Assurance Criteria (MAC). The analytical FE model is adjusted by the direct method of model updating. The same study has been extended to some real-life structures such as plate and GARTEUR structures.

Keywords : damage identification, damage quantification, damage detection using modal analysis, structural damage identification
Conference Title : ICSIDI 2022 : International Conference on Structural Identification and Damage Identification
Conference Location : London, United Kingdom
Conference Dates : August 16-17, 2022