

Vibration Based Damage Identification of Masonry Structures

[navid Maddahi [- MSc in Earthquake Engineering, Faculty of Civil and Environmental Engineering, Tarbiat Modares University, Tehran, Iran

[naser Khaji [- Professor, Faculty of Civil and Environmental Engineering, Tarbiat Modares University, Tehran, Iran

چکیده :

To assess the existing damages of masonry structures, non-destructive dynamic-based methods are attractive tools as they are able to capture the global structural behavior. Due to the heterogeneity and the complexity of the interface's behavior between blocks and mortar, discrete element method (DEM) seems to be the best-adapted to model this kind of structures, in particular for reproducing complex nonlinear post-elastic behavior. However, the DEM does not directly obtain natural frequencies and mode shapes of the structure via a classic vibrational analysis. Therefore, the first objective of this study is to propose a technique to indirectly identify dynamic characteristics of masonry structures using the DEM. The proposed technique is then validated by comparison with the finite element model. Afterwards, micro-modeling strategy is used for masonry walls by the DEM, and particularly post-elastic behavior is verified with valid experimental data. Several numerical simulations are performed, progressive damage is induced in the wall, and sequential structural frequency identification analysis is then performed at each damage stage, aiming at finding adequate correspondence between dynamic behavior and internal crack growth. In this paper, frequency and drift are selected as dynamic behavior and crack growth indices, respectively. Quantifying the relative frequency drop shows, despite the shape does not vary significantly with increasing damage, there is a relation between frequency drop and damage variations, based on analyzed data

کلید واژه : Damage identification, masonry structures, discrete element method, frequency drop

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