

Post-Earthquake Damage Detection Using System Identification with a Pair of Seismic Recordings

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Abstract : A wave-based framework is presented for modeling seismic motion in multistory buildings and using measured response for system identification which can be utilized to extract important information regarding structure integrity. With one pair of building response at two locations, a generalized model response is formulated based on wave propagation features and expressed as frequency and time response functions denoted, respectively, as GFRF and GIRF. In particular, GIRF is fundamental in tracking arrival times of impulsive wave motion initiated at response level which is dependent on local model properties. Matching model and measured-structure responses can help in identifying model parameters and infer building properties. To show the effectiveness of this approach, the Millikan Library in Pasadena, California is identified with recordings of the Yorba Linda earthquake of September 3, 2002.

Keywords : system identification, continuous-discrete mass modeling, damage detection, post-earthquake

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