



Verification and Probabilistic evaluation of multi-isolation in structures under all Possible Hazards

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Abstract

The aim and objective of the presented research is to verify the advantages of a previously proposed inventive method for mitigating the displacement of isolated structures under all possible hazards. A comprehensive probabilistic evaluation was conducted to assess the financial outcomes and the main contribution of this research is to evaluate the validity of the previously proposed method. For the sake of swaying under earthquake and hurricane, the isolated structures need to be provided with a large gap from the adjacent buildings which cause a huge financial loss for the owner and poor serviceability for the residents as result of large displacements. In residential buildings, this large gap can reduce the effective area of each floor even to about 10 percent which makes the constructor reluctant to implement such systems in their structures. In order to tackle this problem, the ridge of the structure has been isolated and it has been used as a constraint to reduce the displacement of the structure so that both constructor and resident can gain financial and convenience-related benefit from it. In the presented research the validity of ridge isolation is investigated and it has been showed that based on FEMA-P695 the proposed system is capable of enhancing the structures' responses significantly. It has been shown that implementation of the proposed system on a 5-story building as an example of the common residential structure will result in less displacement and an average of 18 percent gain relative to the construction's costs for the constructor.

Keywords: Base isolation, Dual isolation, Probabilistic evaluation, tuned mass damper