

## Reliability-Based Ductility Seismic Spectra of Structures with Tilting

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**Abstract :** A reliability-based methodology which uses structural demand hazard curves to consider the increment of the ductility demands of structures with tilting is proposed. The approach considers the effect of two orthogonal components of the ground motions as well as the influence of soil-structure interaction. The approach involves the calculation of ductility demand hazard curves for symmetric systems and, alternatively, for systems with different degrees of asymmetry. To get this objective, demand hazard curves corresponding to different global ductility demands of the systems are calculated. Next, Uniform Exceedance Rate Spectra (UERS) are developed for a specific mean annual rate of exceedance value. Ratios between UERS corresponding to asymmetric and to symmetric systems located in soft soil of the valley of Mexico are obtained. Results indicate that the ductility demands corresponding to tilted structures may be several times higher than those corresponding to symmetric structures, depending on several factors such as tilting angle and vibration period of structure and soil.

**Keywords :** asymmetric yielding, seismic performance, structural reliability, tilted structures

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