



## Developing the UHS for an Important Building in Tehran and Comparison among Its UHS and Well-Known Iranian Design Spectra

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### Summary

A site investigation as well as a Seismic Hazard Analysis (SHA) has been carried out for an important building in centre of Tehran (capital of Iran). The aim has been estimating the level of seismic hazard for the site, developing the Uniform Hazard Spectra (UHS) for horizontal as well as vertical component to design against seismic ground motion more precisely and comparison among the UHS and Iranian Seismic Code design spectrum (Standard No. 2800-05, 3<sup>rd</sup> Edition). At first, it was tried to recognize all the active faults (sources) around the site. Secondly, by using the appropriate attenuation laws, the PGA values on the site were estimated. Maximum values of PGA obtained for the site were 0.932g, 0.626g, 0.497g and 0.358g respectively for 2%, 10%, 20% and 50% probability of exceedence in 50 years ground motions depending on the applied attenuation laws such as Boore-joyner-Fummal, Ambraseys, Ambraseys-Bommer, Ambraseys-Simpson, and Zare-Ashtiany. The UHS, which are more reliable for design purposes, were constructed for the 2%, 10%, 20% and 50% probability of exceedence in 50 years ground motions by using Zare-Ashtiany and Ambraseys-Simpson spectral attenuation laws. Then the design spectrum for Life Safety Level was drawn based on the PGA values and Iranian Seismic Code. Finally, these spectra were compared with each other and the results discussed.

**Keywords:** seismic hazard analysis; Uniform Hazard Spectra; building; Iranian seismic design spectrum; IRAN.

### 1. Introduction

As Iran is located in the high seismic area, reduction of seismic risk in different parts of the country by controlling the behaviour of structures, particularly the key structures is necessary. The best way for performing a reliable seismic hazard analysis is using probabilistic methods. Some studies of this kind has been recently performed by the authors for buildings and bridges [1], [2], [3], [4], [5], [6], [7] and [8]. This paper reports an actual case of applying this methodology for an important building in centre of Tehran. At first, it was tried to recognize all the seismic sources (faults) in a radius of about 110 km around the building, and to evaluate their seismic potential based on the seismic activities in recent centuries. Secondly, by using the appropriate attenuation relationships, the PGA values on the site were estimated by considering the focal depths of recorded earthquakes, horizontal site-to-source distance and the local soil conditions. Then the PGA values were calculated by using probabilistic method. Finally, the UHS in Horizontal component were constructed for the 2% 10%, 20% and 50% probability of exceedence in 50 years ground motions based on spectral acceleration curves.