



Developing the UHS and Comparison with Iranian Standard Design Spectrum (ISDS) for one Important Hospital in Iran

Maryam FIROOZI NEZAMABADI

Assistant Professor
Civil Eng. Dept.
Islamic Azad University –
South Tehran Branch
Tehran, IRAN
firoozi@azad.ac.ir



Maryam Firoozi, born 1972, received her civil engineering degree from the Univ. of Tabriz in 1994, M.Sc. and Ph.D. in structural engineering from IAU in 1999 and 2009 respectively. She has more than 25 scientific papers in conferences and journals.

Fariborz YAGHOobi VAYEGHAN

Assistant Professor
Civil Eng. Dept.
Islamic Azad University –
Pardis Branch
Tehran, IRAN
yaghoobi@pardisiu.ac.ir



Fariborz Yaghoobi, born 1971, received her civil engineering degree from the Univ. of Mashhad in 1993, M.Sc. and Ph.D. in structural and earthquake engineering from IAU and IIEES in 1999 and 2007 respectively. He has more than 25 scientific papers in conferences and journals.

Summary

A site investigation as well as a Seismic Hazard Analysis (SHA) has been carried out for one important hospital in Iran. The aim has been estimating the level of seismic hazard for the site and developing the Uniform Hazard Spectra (UHS) for horizontal component to verify the performed seismic design of the building and preparing seismic rehabilitation process. At first, it was tried to recognize all the active faults around the sites. Secondly, by using the appropriate attenuation relationships and two methods for calculating seismicity parameter, direct and Kijko methods, the horizontal PGA values on the sites were estimated. These values obtained vary between 0.350g and 0.995g for 2%, 0.251g and 0.661g for 10%, 0.212g and 0.533g for 20% and 0.169g/0.381g for 50% probability of exceedence in 50 years ground motions depending on the applied attenuation laws such as Ambraseys, Ambraseys and Bommer and Zare and Ashtiany. The more exact horizontal PGA values, obtained from mean of two mentioned methods (direct and Kijko methods), for 2%, 10%, 20% and 50% probability of exceedence in 50 years ground motions were 0.614g, 0.412g, 0.337g and 0.256g. Finally, 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. The 10% and 2% spectra (first and second hazard level) compared with Iranian Standard Design Spectrum (SDS) and 1.5 times of this spectrum respectively. This comparison showed that the values of UHS for short and medium periods are more and for long periods are less than values of Iranian Standard Design Spectra.

Keywords: seismic hazard analysis; Uniform Hazard Spectra; hospital; Iranian seismic design spectrum; direct method; Kijko method; 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 hospital in Iran. At first, it was tried to recognize all the seismic sources (faults) in a radius of 150 km around the hospital, 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, calculating seismicity parameter and the local soil conditions. The attenuation relationships used in this study are Boore, Joyner and Fummal, Ambraseys and Simpson,