EVALUATING THE SENSITIVITY OF ANALYZING THE SEISMIC HAZARD TO THE TYPE OF EMPIRICAL ATTENUATION RELATIONSHIPS

Parastoo GHANEIE
M.Sc. Graduate, Earthquake Research Center, Ferdowsi University of Mashhad, Mashhad, Iran
p_ghaneie@yahoo.com

Hossein SADEGHI
Associate Professor, Department of Geology, Faculty of Science, Ferdowsi University of Mashhad, Mashhad, Iran
sadeghi@um.ac.ir

Ahmad SHOOSHTARI
Assistant Professor, Department of Civil Engineering, Faculty of Engineering, Ferdowsi University of Mashhad, Mashhad, Iran
ashoosht@um.ac.ir

Keywords: Seismic hazard, Sensitivity Analysis, Attenuation relationship

The aim of the seismic hazard analysis is the prediction of the potential of ground motion during the upcoming earthquakes. Seismic hazard is analyzed by probabilistic and deterministic methods. The deterministic approach estimates the strongest ground motion at a site based on the scenario earthquakes. The probabilistic hazard analysis, on the other hand, leads to providing strong earthquake ground motion at different probable levels. The essentials of this approach are presented in three main sections. In the first, second, and third sections, the seismic sources, the recurrence period of target earthquakes, and the attenuation relationship are determined, respectively. Attenuation relationship presents a ground motion parameter generally associated with magnitude and distance from fault failure location of an earthquake. This empirical relationship is obtained using a statistical fitting of data recorded from a set of earthquakes. Generally, the relationships are investigated jointly or separately for areas with different tectonic properties. Besides, various fitting is introduced by adding dependent variables such as type of fault and site. The aim of the present study is to evaluate the sensitivity of seismic hazard analysis of earthquake by selecting different empirical attenuation relationship. The seismic hazard analysis is done in the Khorasan region (Figure 1).
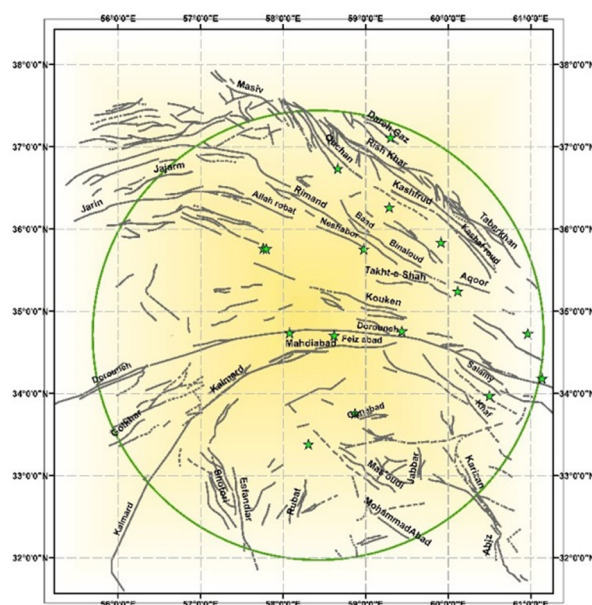

Figure 1. Fault map of the study area (250 km radius from the Kashmar city). The green stars show the location of the main cities.

We used a number of attenuation models for the maximum acceleration of ground motion (PGA). Here we discuss the seismic hazard for a return period of 475 years using the attenuation models by Abrahamson and Silva (1997), Boore et al. (1997), and Sadeghi et al. (2010) for east and for whole Iran. Figure 2 shows the standard deviation map (sensitivity map) created from the four different models. The results showed that the sensitivity of the results to the type of attenuation relationship is very low and it can be ignored.
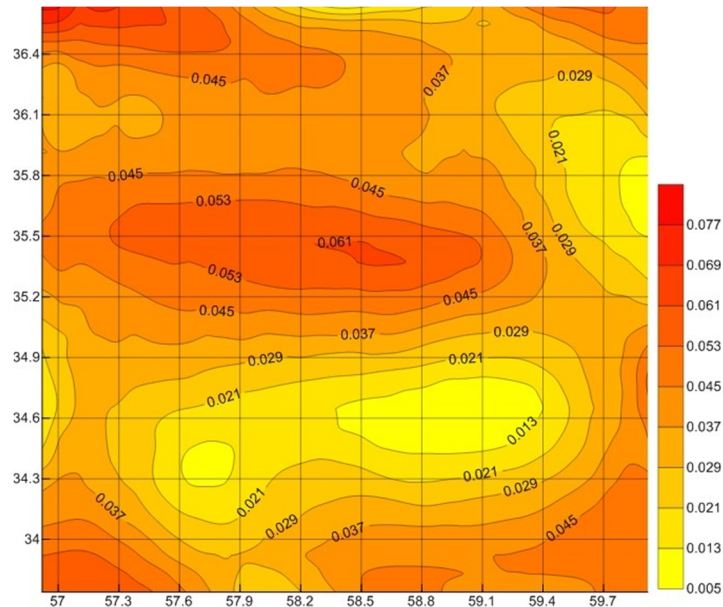

Figure 2. PGA standard deviation map of the seismic hazard maps created by four different attenuation models for a return period of 475 years.

REFERENCES

Abrahamson, N.A. and Silva, W.J. (1997). Empirical response spectral attenuation relations for shallow crustal earthquakes. *Seismological Research Letters*, *68*(1), 94-127.

Boore, D.M., Joyner, W.B., and Fumal, T.E. (1997). Equations for estimating horizontal response spectra and peak acceleration from western North American earthquakes: A summary of recent work. *Seismological Research Letters*, *68*(1), 128-153.

Sadeghi, H., Shooshtari, A., and Jaladat, M. (2010). Prediction of horizontal response spectra of strong ground motions in Iran and its regions. *Proceedings of the Ninth U.S. National and 10th Canadian Conference on Earthquake Engineering: Reaching Beyond Borders*. Paper No. 861.