Three Generation of Seismic Hazard Mapping Turkey

M. Semih Yücemen[1], Ali Koçyiğit[2], Ahmet Yakut[1], Sinan Gençoğlu[3]

[1] *Department of Civil Engineering, Middle East Technical University, Ankara, Turkey*

E-mail : yucemen@metu.edu. tr

[2] *Department of Geological Engineering, Middle East Technical University, Ankara, Turkey*

[3] *Geophysical Engineer, Ankara, Turkey*

Abstract

Deterministic and probabilistic methods have been utilized for the assessment of seismic hazard. In the past, assessment of seismic hazard was carried out from a deterministic point of view, using the combination of macro-seismic and instrumental databases. In the deterministic models, uncertainties associated with the seismicity parameters are not treated explicitly, but to compensate for these uncertainties some conservative values are assigned to them. Considering the randomness of earthquake occurrences with respect to time, space, magnitude and other sources of uncertainties, probabilistic approach appears to be more appropriate. As a result, probabilistic procedures have become of increasing demand in the last three decades for evaluating the seismic hazard at a specific site as well as constructing seismic hazard maps where multi-sites are involved.

The seismic hazard mapping can be considered at three different levels corresponding to three generation of seismic hazard maps. A general overview of the methods utilized for the assessment of seismic hazard at these three different levels is presented in the paper. The implementation of the three levels of seismic hazard mapping is illustrated based on the practice in Turkey. Particular emphasis is given to the assessment of seismic hazard due to active faults and the main steps for the quantification of the seismic hazard due to active faults are listed. These steps can also be considered as the standards for the development of new generation of probabilistic seismic hazard maps. To illustrate the implementation of these steps seismic hazard is mapped for Bursa, a city in Turkey which is subject to earthquake threat due to a number of active faults.

Key words: Seismic hazard, renewal model, characteristic earthquake, magnitude conversion, Bursa