

Seismic Hazard Assessment of Tehran

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Abstract : Due to its special geological and geographical conditions, Iran has always been exposed to various natural hazards. Earthquake is one of the natural hazards with random nature that can cause significant financial damages and casualties. This is a serious threat, especially in areas with active faults. Therefore, considering the population density in some parts of the country, locating and zoning high-risk areas are necessary and significant. In the present study, seismic hazard assessment via probabilistic and deterministic method for Tehran, the capital of Iran, which is located in Alborz-Azerbaijan province, has been done. The seismicity study covers a range of 200 km from the north of Tehran ($X=35.74^\circ$ and $Y= 51.37^\circ$ in LAT-LONG coordinate system) to identify the seismic sources and seismicity parameters of the study region. In order to identify the seismic sources, geological maps at the scale of 1: 250,000 are used. In this study, we used Kijko-Sellevoll's method (1992) to estimate seismicity parameters. The maximum likelihood estimation of earthquake hazard parameters (maximum regional magnitude M_{max} , activity rate λ , and the Gutenberg-Richter parameter b) from incomplete data files is extended to the case of uncertain magnitude values. By the combination of seismicity and seismotectonic studies of the site, the acceleration with antiseptic probability may happen during the useful life of the structure is calculated with probabilistic and deterministic methods. Applying the results of performed seismicity and seismotectonic studies in the project and applying proper weights in used attenuation relationship, maximum horizontal and vertical acceleration for return periods of 50, 475, 950 and 2475 years are calculated. Horizontal peak ground acceleration on the seismic bedrock for 50, 475, 950 and 2475 return periods are 0.12g, 0.30g, 0.37g and 0.50, and Vertical peak ground acceleration on the seismic bedrock for 50, 475, 950 and 2475 return periods are 0.08g, 0.21g, 0.27g and 0.36g.

Keywords : peak ground acceleration, probabilistic and deterministic, seismic hazard assessment, seismicity parameters

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