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Seismic Hazard Study and Strong Ground Motion in Southwest Alborz, Iran

Authors : Fereshteh Pourmohammad, Mehdi Zare

Abstract : The city of Karaj, having a population of 2.2 millions (est. 2022) is located in the South West of Alborz Mountain Belt in Northern Iran. The region is known to be a highly active seismic zone. This study is focused on the geological and seismological analyses within a radius of 200 km from the center of Karaj. There are identified five seismic zones and seven linear seismic sources. The maximum magnitude was calculated for the seismic zones. Scine tghe seismicity catalog is incomplete, we have used a parametric-historic algorithm and the Kijko and Sellevoll (1992) method was used to calculate seismicity parameters, and the return periods and the probability frequency of recurrence of the earthquake magnitude in each zone obtained for 475-years return period. According to the calculations, the highest and lowest earthquake magnitudes of 7.6 and 6.2 were respectively obtained in Zones 1 and 4. This result is a new and extremely important in view point of earthquake risk in a densely population city. The maximum strong horizontal ground motion for the 475-years return period 0.42g and for 2475-year return period 0.70g also the maximum strong vertical ground motion for 475-years return period 0.25g and 2475-years return period 0.44g was calculated using attenuation relationships. These acceleration levels are new, and are obtained to be about 25% higher than presented values in the Iranian building code.

Keywords : seismic zones, ground motion, return period, hazard analysis
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