8th International Conference on Seismology & Earthquake Engineering
11-13 Nov. 2019, Tehran, Iran

ASSESSMENT OF NGA IN CONSIDERATION OF UNCERTAINTY RELATED TO FAULT RUPTURE MODEL PARAMETERS

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Keywords: Dip angle (δ), Down dip rupture width (W), Subsurface rupture length (L), Probabilistic seismic hazard analysis, Monte-Carlo simulation

The earthquakes are the only naturally occurring unpredictable catastrophes. The event of earthquake, the associated ground motion and the effect on structures are the fundamental element in evaluating earthquake risk (McGuire, 2004). As ground motion parameters like spectral acceleration (SA) etc. are the base of analysis and design of structures achieve to a logical estimation of these parameters is important (Baker 2008). The key element within the seismic hazard analysis (SHA) is ground motion prediction equation (GMPE). Magnitude, source to site distance, site characteristic and seismology parameters are the effective element for determination of ground motion parameters. Magnitude and source to site distance have more prominent role than others (Campbell, 2003; Atkinson, 2009). Uncertainty in measuring of magnitude usually is very low. Dip angle (δ), down dip rupture width (W) and rupture length (L) directly affect the source to site distance. Accurate determination of these parameters is not always possible and in most cases theses parameters have uncertainty. Due to integration limitation in classic seismic hazard analysis (SHA) the uncertainty of these parameters neglected and purposed as a constant value. Mont Carlo simulation can consider these uncertainties in SHA.

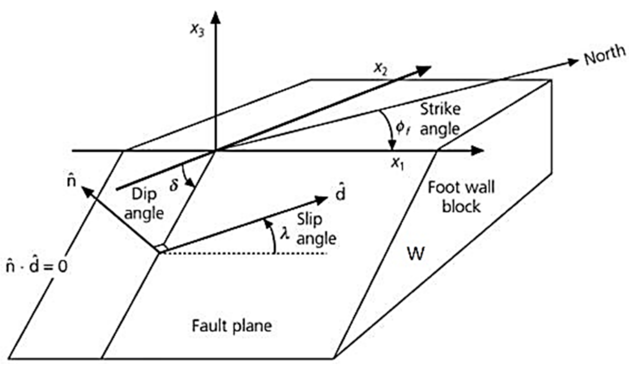

Figure 1. Describe of rupture model parameters.

Ignoring uncertainty in fault rupture depending on the attenuation relation and the style of faulting leads to over/underestimation of hazard, especially at shorter periods in a characteristic band of region (Farhadi, 2016).

In this study, mentioned uncertainties in the reverse fault utilizing the Monte Carlo simulation method the results of the Next Generation Attenuation 2014 (NGA-WEST2 2014) examined in comparison with NGA08. The results show that ground motion models of Boore, Stewart, Seyhan and Atkinson (BSSA14) (Boore et al., 2014) lead to a better consideration of fault rupture uncertainties than Boore and Atkinson (BA08) (Boore and Atkinson, 2008). In other words, ignoring these uncertainties has less impact on the final results of hazard analysis but by this improvement in distance of about 40 km from the fault still has difference about 30%. BSSA14 in its functional form does not have any of the fault rupture parameters (δ, W, L) obviously and the only difference is improving the database; therefore, it is expected to provide a better prediction. At more than 50 km from the fault, ground motion models of Abrahamson, Silva and Kamai (ASK14) (Abrahamson et al., 2014) shows weaker performance than Abrahamson, Silva (AS08) (Abrahamson & Silva, 2008), that's because of adding horizontal distance off the end of the rupture measured parallel to strike parameter (Ry) to ASK14. By adding this parameter, the standard deviation of the equation has increased and this parameter also describes the fault length. Also, when the dip angle is in the range of 50 to 70 degrees BSSA14 and ASK14 compared to the BA08 and AS08 show low change in considering uncertainties.

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