



Modeling of Long-Period Ground Motion for Marmara Region

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There is a strong need for the development of reliable techniques for the assessment of long period earthquake ground motions for the earthquake resistant design of tall buildings, long bridges and base isolated structures, especially for near field conditions. To provide an example to the assessment of long period ground motion a comprehensive study has been carried out for the Marmara Region, Turkey. The probabilistic earthquake hazard has been investigated using PEER-NGA (2007) attenuation relationships for spectral accelerations up to 10s periods corresponding to different average return periods. PGA values were used to obtain the EuroCode- whereas, SA(0.2s and 1s) were used to obtain the NEHRP (2003)- based response spectra. SA (0.2s, 1s, 2s, 4s, 6s, 8s and 10s) values were used to plot the equi-hazard spectrum. Associated hazard deaggregation has been conducted for several selected sites to obtain rational estimates of the deterministic long period spectral accelerations and the deterministic spectral shapes. Furthermore Newmark-Hall type tripartite response spectra were plotted using peak values of acceleration, velocity and displacement with appropriate site response modifications. Comparison of the findings indicate significant variation of long period spectral accelerations. The accuracy of seismic design spectra given in current codes is not sufficient at these periods. There is also a need to develop guidelines for the selection of design basis ground motion for long period or highly nonlinear (softening) structures.