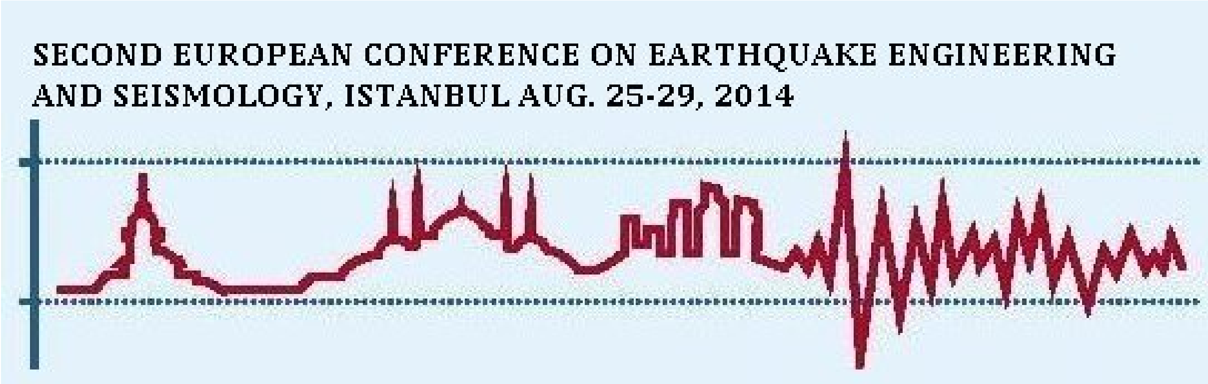

INCORPORATION OF SPECTRAL DAMPING SCALING MODELS IN PSHA

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Empirical/semi empirical ground motion prediction models provide spectral intensity estimates for a typical viscous damping value of 5%, almost unexceptionally. On the contrary, structural or non-structural systems having different structure types and material properties, as well as being subjected to different shaking intensities, are undoubtedly expected to exhibit response patterns varying at a broader damping ratio range. There has been an increasing demand in practice for predicting design basis spectral intensities for systems with specific damping ratios, for structures including but not limited to high rise buildings, critical elements of transporation infrastructure and energy production facilities. Based on the currently increasing awareness, empirically based models which enable scaling of 5% damped reference intensity estimates to a broader range varying from 0.5% to 30% as a function of earthquake magnitude, source to site distance, or local site conditions have recently become available. These models are generally based on careful processing and interpretation of expanded global strong motion databases and within the confines of this study, are utilized for further integration with the PSHA framework.

The first part of our work is based on presenting the results of direct integration of these models to the the conventional PSHA framework; which basically includes simultaneous evaluation of multiple earthquake scenarios. The attempt basically includes direct integration of damping scaling models into an in-house developed PSHA code, and presents the impact on uniform hazard spectra for various damping ratios and return period of ground motion for a sample site located in a seismically active region in Turkey.

We also compare the results obtained via direct integration approach to a more simplified form incorporating most dominant weighted sets using relevant predictive parameters such as earthquake magnitude and source to site distance derived from deaggregated hazard. An optimization study to assess the number of M, R pairs to be included in the simplified approach for various return periods of ground motion is also presented.

The results of the study is targeted towards, i) providing a better understanding of the application of damping scaling models coupled with seismic hazard assessments incorporating multiple scenarios, ii) optimization of the procedure to meet the practical design demands and to concretize the protocols for PSHA computer code improvements.

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