

CORRELATION BETWEEN SPECTRAL ACCELERATIONS AT MULTIPLE PERIODS IN THE ZAGROS REGION, IRAN

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The conditional spectra (CS) are the new emerged design spectra (Baker, 2011) in which try to cope with the Uniform Hazard Spectrum (UHS) shortcomings (Cimellaro, 2013). The correlation between spectral accelerations at multiple periods is the key element within the CS framework (Baker and Cornell, 2006). This correlation is obviously based on a given ground motion dataset. Therefore, the available correlation models need to be investigated in order to be applied for the new active seismic regions. Therefore, the available correlation models are compared with a newly proposed model in this paper as seen in Figure 1.

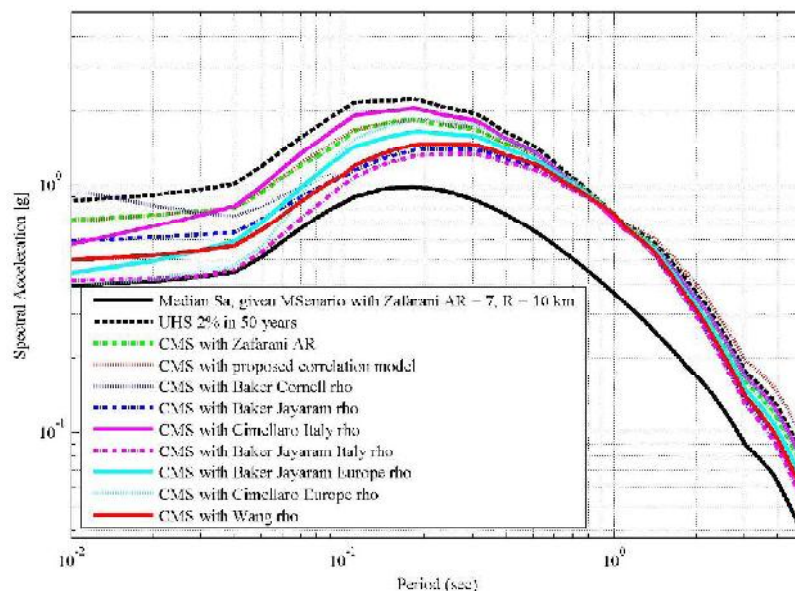


Figure 1. The different CS based on different correlation models

The mathematical form of the correlation model, which has been proposed in this paper, is written in the following Equation (1). It is worth noting that this model was obtained by incorporating the GP toolbox (GeneXProTools(4.0.954)) with the Zagros ground motion dataset.

$$A = \left(\sin \left(\left(\frac{\exp((a * T_2))}{\exp((T_1 * T_2))} \right) \right)^4 \right) + \left(\exp \left(\log_0 \left(\left(\frac{(T_1^4)}{(b - T_1)^2} \right) \right) \right) \right) \quad (1)$$

$$\rho = A + \left(\left(\log_0 \left(\left(\frac{T_1}{T_2} \right) * \cos(c) \right) * \log_0 (d^2) \right) \right)$$

where $a = -7.239532$, $b = 9.685639$, $c = 9.685639$ and $d = 1.470795$ are the parameters of the proposed correlation coefficient model in Equation (1). The conditional spectra, based on the proposed correlation model, are compared with the experimental correlations based on the Zagros database as seen in Figure 2. The results show that the proposed correlation model works appropriately in the Zagros region and other available models contain some level of bias.

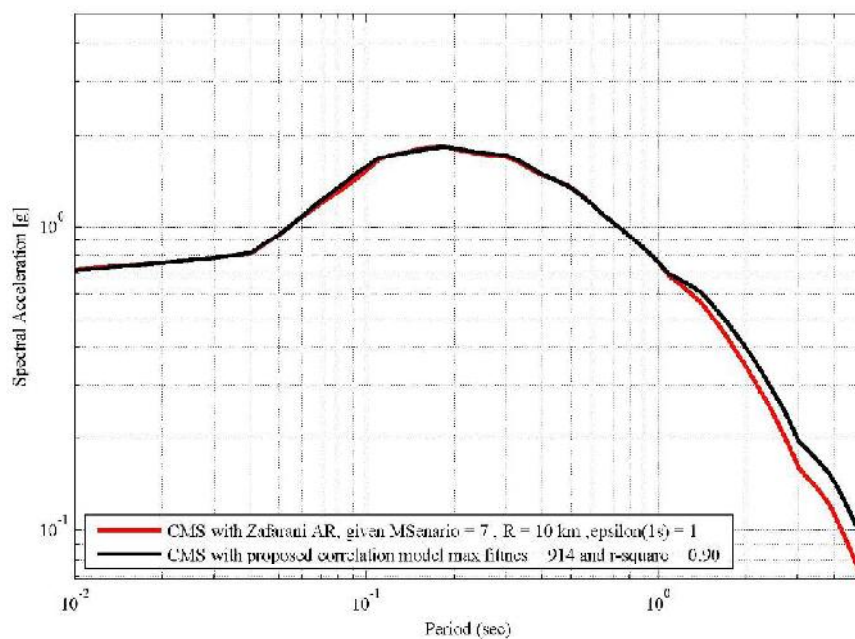


Figure 2. The CS based on the proposed correlation model and based on the Zagros dataset

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