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Seismic Hazard analysis of Adjaria Region in Georgia

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The most commonly used approach to determining seismic-design loads for engineering projects is probabilistic seismic-hazard analysis (PSHA). The primary output from a PSHA is a hazard curve showing the variation of a selected ground-motion parameter, such as peak ground acceleration (PGA) or spectral acceleration (SA), against the annual frequency of exceedance (or its reciprocal, return period). The design value is the ground-motion level that corresponds to a preselected design return period. For many engineering projects, such as standard buildings and typical bridges, the seismic loading is taken from the appropriate seismic-design code, the basis of which is usually a PSHA. For more important engineering projects— where the consequences of failure are more serious, such as dams and chemical plants—it is more usual to obtain the seismic-design loads from a site-specific PSHA, in general, using much longer return periods than those governing code based design.
Calculation of Probabilistic Seismic Hazard was performed using Software CRISIS2007 by Ordaz, M., Aguilar, A., and Arboleda, J., Instituto de Ingeniería, UNAM, Mexico. CRISIS implements a classical probabilistic seismic hazard methodology where seismic sources can be modelled as points, lines and areas. In the case of area sources, the software offers an integration procedure that takes advantage of a triangulation algorithm used for seismic source discretization. This solution improves calculation efficiency while maintaining a reliable description of source geometry and seismicity. Additionally, supplementary filters (e.g. fix a sitesource distance that excludes from calculation sources at great distance) allow the program to balance precision and efficiency during hazard calculation.
Earthquake temporal occurrence is assumed to follow a Poisson process, and the code facilitates two types of MFDs: a truncated exponential Gutenberg-Richter [1944] magnitude distribution and a characteristic magnitude distribution [Youngs and Coppersmith, 1985]. Notably, the software can deal with uncertainty in the seismicity input parameters such as maximum magnitude value. CRISIS offers a set of built-in GMPEs, as well as the possibility of defining new ones by providing information in a tabular format.
Our study shows that in case of Ajaristkali HPP study area, significant contribution to Seismic Hazard comes from local sources with quite low Mmax values, thus these two attenuation lows give us quite different PGA and SA values.