

Uniform risk-targeted maps for Romania

Radu Vacareanu, Florin Pavel, Veronica Coliba, and Ionut Craciun

Seismic Risk Assessment Research Center, Technical University of Civil Engineering of Bucharest, Romania

The development of the uniform risk-targeted maps (i.e. Douglas et. al, 2013; Luco et. al, 2015) for Romania, starting from a new probabilistic seismic hazard assessment (PSHA) (Vacareanu et. al, 2016) performed within the BIGSEES national research project (<http://infp.infp.ro/bigsees/default.htm>) financed by the Romanian Ministry of National Education and Scientific Research in the period 2012-2016, is briefly presented hereinafter. The engineering demand parameter considered in the risk analysis is the peak ground acceleration. The exceedance of the ultimate limit state is considered to correspond to the structural failure criterion. The seismic hazard curves corresponding to sites originating from a uniform fine grid covering Romanian territory are obtained through PSHA. The slope of the seismic hazard curves (k parameter) for mean return periods in the range 30 – 2475 years (which mimic a linear fit in log-log space) is computed for over 1000 sites covering the entire territory of Romania. The fragility curve is considered to be well represented by a lognormal distribution characterized by a mean value of peak ground acceleration equal to the code-based design value for the analyzed sites and a lognormal standard deviation of 0.5. Next, the annual probability of structural failure, $P_{f,st}$ is computed for all the selected sites using the convolution integral between the hazard curves and the fragility function. Finally, the corresponding peak ground accelerations for more than 1000 sites are obtained for a target annual failure probability $P_f = 5 \times 10^{-3}$. The obtained peak ground accelerations are compared with the values with 10% and 20% exceedance probability in 50 years obtained through classical PSHA and, in addition, the impact of the results obtained on the seismic design of new structures is assessed, as well.

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References

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