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SCENARIO BASED SEISMIC HAZARD ASSESSMENT

Lessons learnt from the destructive earthquakes occurred during the new millennium provide new opportunities to take action, revise and improve the procedure for seismic hazard assessment. When dealing with cultural heritage and critical structures (e.g. nuclear power plants), where it is necessary to consider extremely long time intervals, the standard hazard estimates are by far unsuitable, due to their basic heuristic limitations. A viable alternative to traditional seismic hazard assessment is represented by the use of the scenario earthquakes, characterized at least in terms of magnitude, distance and faulting style, and by the treatment of complex source processes.

The scenario-based methods (NDSHA) for seismic hazard analysis, where realistic and duly validated synthetic time series, accounting for source, propagation and site effects, are used to construct earthquake scenarios. The NDSHA procedure provides strong ground motion parameters based on the seismic waves propagation modeling at different scales accounting for a wide set of possible seismic sources and for the available information about structural models. Actually, the proposed method can be applied at regional (national) scale, computing seismograms at the nodes of a grid with the desired spacing, also integrated with time dependent scenarios, or at local (metropolitan) scale, taking into account detailed source characteristics, the path and local geological and geotechnical conditions by means of 3D laterally heterogeneous anelastic models.

The relevance of the realistic modeling, which permits the generalization of empirical observations by means of physically sound theoretical considerations, is evident, as it allows for the optimization of the structural design with respect to the site of interest.