SEISMIC RELIABILITY PROCEDURES AND INPUT GROUND-MOTIONS FOR NONLINEAR DYNAMIC ANALYSES

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In the framework of Performance-Based Earthquake Engineering the actual research trend is to develop rigorous probabilistic approaches. These latter involve complex nonlinear problems with many random and non-random variables. For this reason many practical reliability methods have been recently developed. The research carried out by the group is mainly focused on the extension two of these approaches: the "2000 SAC/FEMA Method" and response-surface based methods. The 2000 SAC/FEMA Method was applied to analyse the reliabiliy of R.C. frames with and without dampers. Response-surfaces with random factors are statistical models used for approximating seismic capacity with computational efficiency. A proper selection criterion for the accelerograms is crucial for the correct prediction of structural response. The research group developed a new probabilistic seismic hazard analysis (PSHA) procedure. Using this results the group developed a new vector ground-motion intensity measure based on the combination of PGA and PGV and proposed a ground-motion selection criterion based on this parameter. The research group also developed procedures for simulating non-stationary stochastic accelerograms. The so generated accelerograms were used as input for nonlinear dynamic analyses of various RC structures and gave results that compared very well with those obtained from recorded accelerograms. Particular care was put into the study of the sensitivity of the results to the ground-motion intensity measure used. This issue was further investigated during a collaboration with the "Blume Earthquake Engineering Center" at Stanford University, that lead to the proposal to a new intensity measure. Finally, as a results of a collaboration with Imperial College, London, the research group developed a new criterion to select and scale recorded accelerograms starting from the definition of a scenario in terms of magnitude and source-to-site distance. The procedure is based on the definition of a target response spectra, using the data provided by spectral-acceleration attenuation relationships.

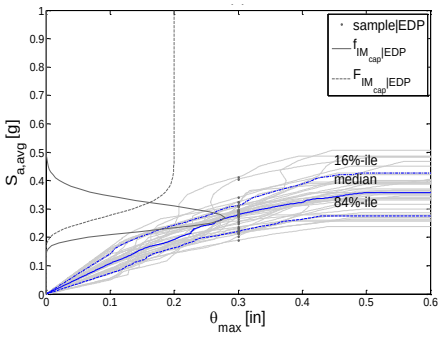

Fig. 1. IDA curves calibrated for a given seismic intensity measure (Bianchini).

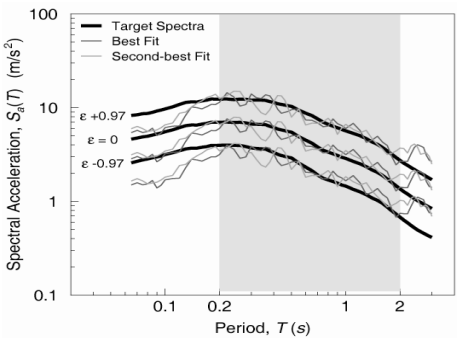

Fig. 2. Selection of recorded accelerograms (Buratti).

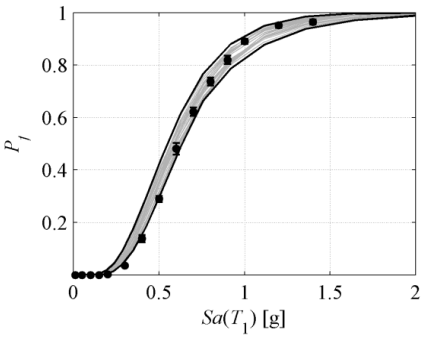

Fig. 3. Fragility curves obtained from response surface models (Buratti).

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LINKS AND CONTACTS

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