

A method for probabilistic displacement-based design of RC structures

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ABSTRACT

A method is proposed for seismic design of reinforced concrete structures to meet multiple structural performance requirements expressed in terms of exceedance probabilities. The method is approximate in nature and rests on two main results: the closed form solution for the mean annual rate of exceedance of a limit state due to Cornell and co-workers (2002), and the so-called equal displacement rule. Compliance with the design objectives is obtained through a gradient-based search algorithm in the space of the design variables with reference to a linear elastic proxy of the structure. To this purpose analytical gradients for the Cornell's formula are derived. Two applications illustrate the method and its validation through inelastic time-history analysis. From the limited investigation carried out the method appears to offer satisfactory accuracy.