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Seismic Design Procedures in the Framework of Evolutionary Based Structural Optimization

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Abstract:	<p>The objective of this paper is twofold: to evaluate seismic design procedures of 3D frame structures and to present a performance-based design procedure for steel structures both in the framework of structural optimization. The evaluation is based on European seismic design codes where procedures based on both linear and nonlinear time history analysis are adopted. On the other hand the structural performance in the proposed performance based design procedure is evaluated by means of the reliability demand and resistance methodology of U.S. FEMA-350 (Federal Emergency Management Agency) guidelines where the uncertainties and randomness in capacity and seismic demand are taken into account in a consistent manner. The structure has to be able to respond for different hazard levels with a desired confidence. Both Nonlinear Static and Nonlinear Dynamic analysis procedures are used in order to obtain the response at two hazard levels. For the solution of the optimization problems a highly efficient evolutionary algorithm is adopted</p>