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Torsional design criteria in building codes and comparison with more accurate modeling using structural optimization tools

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Title:	**TORSIONAL DESIGN CRITERIA IN BUILDING CODES AND COMPARISON WITH MORE ACCURATE MODELING USING STRUCTURAL OPTIMIZATION TOOLS**
Year:	2013
Author:	Bellos, John ; Bakas, Nikolaos
Abstract:	It is widely accepted that seismic design philosophies do not follow the efficiency of seismic analysis methods is quite remarkable. Torsionally unbalanced structures, is a common field where any of the proposed design methods tends to exaggerate the torsion effect [1-3]. The implementation of these methods in cases, may make the building more vulnerable. Seismic design codes, implement a number of recommendations in order to deal with torsionally unbalanced buildings. Recently, new design approaches have been proposed taking into account the nonlinear behavior of the buildings in more than one earthquake intensity levels, denoted as Performance Based Design (PBD). In this work, the recommendations of various design codes and design philosophies, proposed by various researchers, are incorporated in the formulation of a number of structural optimization problems for multi-storey 3D RC buildings, in order to assess the performance of torsional unbalanced buildings under severe earthquake loading. The structural optimization framework is formulated as a combined sizing and topology optimization problem. The formulation of the problems incorporates both code demands and architectural constraints. The solution of the optimization procedure is based on evolutionary algorithms, while the optimum designs obtained with the various formulations are assessed with respect to both initial and limit-state dependent costs taking into consideration the behavior of the structure during its life time.

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