

# Continuum Topology Optimization for Concept Design of Frame Bracing Systems

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## *Abstract*

Discrete ground structure topology optimization design methods have to date received considerable attention in structural engineering. An alternative class of structural topology optimization methods which not yet received much attention in structural engineering, but which have undergone considerable development in the past decade are the so-called *continuum* formulations. In this work, a continuum structural topology optimization formulation is presented and applied to the concept design optimization of structural bracing systems which are needed to stiffen tall structures against sidesway under lateral wind and seismic type loadings. While demonstrated here in the context of these specific design examples, continuum structural topology optimization methods are believed to hold potential as a design tool for wide range of civil engineering type structures. A variety of continuum topology design formulations, including static compliance minimization and eigenvalue optimization, are explored, and solution parameters are varied to show that a number of design possibilities can be realized as solutions.

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