

Keynote Paper

Collapse Performance Assessment of Buildings under Extreme Loads

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ABSTRACT:

Existing buildings are in danger of disproportionate collapse due to low probability or extreme events. Three-dimensional load redistribution within a building is not well understood because of the difficulty in analyzing this phenomenon from field observations, and experimental research and data on collapse performance of full-scale buildings have been very limited. This research presents field testing of ten reinforced concrete, steel and masonry buildings that have been tested by physically removing columns or load bearing walls from the first story of the buildings. Building collapse performance has been evaluated when one or more vertical load carrying elements are suddenly lost. Performance of the multi-story buildings was simulated using simplified two-dimensional and detailed three-dimensional finite element models to better understand dynamic performance and collapse mechanism and to demonstrate the collapse risk. The simulated and measured response of the buildings were compared to investigate the accuracy of computational models, and design, assessment and analysis procedures used.
