EMI 2022
Baltimore, MD, May 31 - June 3, 2022

Title: Design of Force-Limiting Deformable Connections in High-Performance Earthquake-Resilient Buildings

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Novel force-limiting deformable connections reduce the seismic induced horizontal forces transferred from the floor-diaphragms to the seismic force-resisting systems in high-performance earthquake-resilient buildings with base flexural yielding mechanisms (e.g., reinforced concrete shear wall buildings) or base rocking mechanisms (e.g. precast rocking shear walls, self-centering concentrically braced frames) [1, 2, 3]. The force-limiting connections act as a seismic response modification mechanism and their use mitigates the contribution of the second and higher mode responses in the dynamic response of these buildings [2]. This presentation focuses on a force-based design method of force-limiting deformable connections. The proposed design method determines the limiting forces at each floor of the building based on a modified version of the ASCE/SEI 7-16 alternative seismic design force method for diaphragms. Results from numerical earthquake simulations of twelve-story, eight-story, and four-story reinforced concrete shear wall example buildings and a nine-story self-centering special concentrically braced frame building show that the proposed method enables the preliminary design of force-limiting deformable connections in buildings with reduced magnitude and variability in their seismic response compared to conventional buildings.
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