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Utilization of Simulated Ground Motions for Engineering Performance Assessment of Tall Buildings

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Utilization of simulated ground motions for engineering performance assessment of tall buildings, *Nenad Bijelic, Ting Lin, and Gregory Deierlein* (Poster 052)

This work focuses on utilization of simulated ground motions for nonlinear structural response estimation of tall buildings. Structural building response is first estimated using conventional methods (multiple stripe analysis, incremental dynamic analysis), where recorded and simulated (broadband) ground motions are selected and scaled based on consistent hazard targets that consider spectral shape and duration. Performance demand parameters of a twenty-story building are examined at different ground motion intensity levels up to collapse to determine whether statistically significant differences exist between the responses to simulated and recorded ground motions. Amplitude scaling of both simulated and recorded ground motions is used in these analyses, following conventional approaches used in earthquake engineering. These comparisons revealed insignificant differences between the recorded and simulated ground motions, when scaled to match consistent hazard parameters. In a second on-going phase of the study, structural response is evaluated using unscaled, large-amplitude simulated ground motions generated as part of SCEC's CyberShake project. Differences in response to simulated and recorded ground motions are contrasted and opportunities and challenges for using simulated ground motions in structural performance assessment are discussed.