USE OF PHYSICS-BASED GROUND MOTION SIMULATIONS IN PBEE

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ABSTRACT

Earthquake-induced ground motion prediction is presently under-going a paradigm shift from the empirical prediction of ground motion intensity measures (IMs, e.g. PGA, SA), based on regression analysis of observed IMs from past earthquakes, toward the use of physics-based simulation methods that directly predict the ground motion time series (i.e. multi-component acceleration as a function of time). The growing use and potential of ground motion simulation for seismic hazard analysis, and the adoption of simulated motions in earthquake engineering analyses have several significant implications for PBEE. This presentation (1) discusses compares and contrasts the use of simulated or as-recorded ground motions in response history analyses; (2) provides examples of validation of simulated ground motions against motions recorded from past events to quantify their predictive capability; (3) examines the subsequent seismic response of structural and geotechnical systems to simulated and as-recorded ground motions; and (4) discusses current databases of simulated ground motions, and the necessary computational infrastructure required to accelerate their adoption in PBEE analyses.

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