2024 DOE/NRC Natural Phenomena Hazards Meeting - Abstract

A Graded Approach to Assess Seismically-Induced Building Pounding

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Seismically-induced pounding may occur when two or more buildings at proximity develop out-of-phase vibration due to their different dynamic characteristics. The pounding not only affects the seismic performance of the buildings but also can result in unacceptable performance of the contained equipment:

> *Structural damage:* Building pounding can cause structural damage ranging from local failure such as concrete cracking and spalling to structural joint failure and progressive collapse. The impact of the pounding on the seismic performance of the buildings is complex and can depend on many parameters such as structural system irregularities, building dynamic properties, foundation and soil condition and ground motion magnitude and intensity.
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> *Unacceptable equipment performance*: Building pounding can generate increased high-frequency "shock" accelerations within a structure. These increased accelerations can result in spurious or negative equipment behavior especially for those that contain mechanical relays that may be susceptible to relay chatter.

In new construction, it is typically desirable to design sufficient separation to avoid pounding. However, the following examples may present conditions where building pounding must be evaluated:

- Evaluation of existing facilities for updated seismic hazards, e.g., as part of a Natural Phenomena Hazards (NPH) update as is prescribed in DOE-STD-1020;
- Evaluation of structures for multiple seismic hazard levels, e.g., as part of a Seismic Probabilistic Risk Assessment (SPRA);
- Evaluation of safety-related or more risk important structures (e.g., Seismic Design Category (SDC) 5) with adjacent non-safety-related or lower SDC structures.

This presentation will provide a graded approach for assessing building pounding and consequences. The discussed methods will include screening, simplified particle kinetics-based evaluation, and explicit numerical modeling.