GEO-INSTITUTE
7th ANNUAL LIVE STREAMING WEB CONFERENCE

The Geo-Institute Earthquake Engineering and Soil Dynamics Technical Committee will live-stream the session "Seismic Hazard Evaluation for the Western, Central, and Eastern US" on Monday, December 5 at 11 AM EST. The topics include:

"Developments and Challenges for Seismic Hazard Assessment in the Central and Eastern United States,"

***Glenn J. Rix**, Ph.D., P.E., M. ASCE, and **Christie Hale**, Ph.D., M. ASCE*

Over the past decade, there have been significant advancements in the understanding of seismic hazard in the Central and Eastern United States (CEUS), where our brief seismic record is a poor guide to quantifying the potential for strong ground shaking. Landmark studies in seismic source characterization and ground motion characterization have produced regional models that greatly improve our ability to quantify the mean seismic hazard and its associated uncertainty in the region, while advancements in site response analysis allow better characterization of local site effects. Despite these advancements, significant challenges remain, including the lack of regional shear wave velocity characterization and the development of ground-motion time histories from a dataset with poor magnitude and distance coverage. This presentation will provide an overview of developments in seismic hazard assessment in the CEUS, including available approaches, seismic source models, and ground motion models used to evaluate seismic hazard, and how these approaches, models, and the resulting ground motions differ from those in the Western United States (WUS). Available methods for accounting for local site effects will be discussed, including developments in simplified site adjustment models and site-specific site response analysis.

"*Application of non-ergodic site response in earthquake engineering practice*," ***Jonathan P. Stewart**, Ph.D., P.E., M.ASCE*

This would discuss how site-specific procedures can be applied when the USGS National Seismic Hazard Model (NSHM) is not applied. These procedures are increasingly being used on high-profile projects, and while they require much more work to apply, there are appreciable benefits.

"Characterization of Epistemic Uncertainty in Site Response," ***Adrian Rodriguez-Marek**, Ph.D., M.ASCE*

Site-specific probabilistic seismic hazard analysis (PSHA) generally requires the conduct of site response analyses to quantify the site amplification at a site. Consistent with the conduct of modern PSHA, the site response analyses must incorporate all sources of epistemic uncertainty. For site response, this has traditionally been achieved by creating a logic tree with branches for alternative shear-wave velocity (V_S) profiles. However, the distribution of amplification factors obtained from a small number of weighted V_S profiles will often be quite narrow at some oscillator frequencies. We propose an alternative approach to capturing epistemic uncertainty in site response in order to avoid such unintentionally constricted distributions of amplification factors using more complete logic-trees for site response analyses. Nodes are included for all the factors that influence the calculated amplification factors, which may include shallow V_S profiles, deeper V_S profiles, depth of impedance contrasts, low-strain soil damping, and choice of modulus reduction and damping curves. Site response analyses are then executed for all branch combinations to generate a large number of frequency-dependent amplification factors. Finally, these are re-sampled as a discrete distribution

with enough branches to capture the underlying distribution of amplification factors (AFs). While this approach improves the representation of epistemic uncertainty in the dynamic site response characteristics, modeling uncertainty in the AFs is not automatically captured in this way, for which reason it is also proposed that a minimum level of epistemic uncertainty should be imposed on the final distribution.