Geotechnical Engineering Seminar
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Parametric uncertainty in nonlinear site response for typical sedimentary sites in Southern California

by Wei Li
CEE, Georgia Tech

ABSTRACT:

Among the uncertainties associated with the response simulation of near surface geologic formations to strong seismic motion, the parameter uncertainty of nonlinear constitutive soil models is a critical component of the site response algorithm selection decision process, since it determines the geotechnical investigation cost and associated degree of accuracy of the simulated process. Currently, there exist very few systematic studies on the role of parameter uncertainty in strong motion site response predictions of future earthquakes, due to the lack of statistically significant data sets of in-situ strong motion records. To overcome the shortage of seismic input motion data, we here combine nonlinear ground response analyses based on layered soil profiles with randomized soil dynamic properties with realistic rupture scenarios of the San Andreas Fault evaluated via recently developed broadband ground motion simulation techniques and detailed descriptions of the 3D geology of the Los Angeles basin. The base soil profiles in the analysis correspond to three downhole geotechnical array stations in Southern California and the randomized parameters are the shear wave velocity, shear modulus reduction and attenuation vs. cyclic strain amplitude, and the soil layer thicknesses. We investigate the extent to which the variability in nonlinear soil parameters affects the predicted ground surface response on sedimentary sites. Results indicate which parameters should be prioritized for site investigation expenditures as a function of the site conditions of interest subjected to a given set of ground motion characteristics for a given level of nonlinear soil modeling complexity.

Bio

Wei Li joined the Geoquake Group, School of Civil and Environmental Engineering at the Georgia Institute of Technology as a Graduate Assistant in January 2006. He received his BS in Civil Engineering from the Shandong University of Technology (Ji'nan, China) in 1996. He continued his studies at the Geotechnical Institute at Hohai University (Nanjing, China) where he obtained an MS in 1999. After graduating from Hohai University, he worked as a geotechnical engineer in Tianjin Port Engineering Institute for five years. He also worked as a Graduate Assistant in University of Akron for one and a half years. His primary research interests are in numerical methods in earthquake engineering and nonlinear dynamic soil behavior.