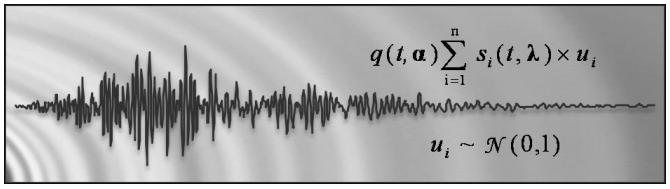
CE 295 - RESEARCH SEMINARS in STRUCTURAL & GEOTECHNICAL ENGINEERING

STOCHASTIC EARTHQUAKE GROUND MOTION SIMULATION AND APPLICATIONS FOR SEISMIC ANALYSIS OF INFRASTRUCTURE SYSTEMS

Date: Monday, April 28th
Time: 10:00AM-11:00AM
Room: CalIT 2 – Room 3008
Guest Speaker: Sanaz Rezaeian, Ph.D.



Abstract:

A method for generating an ensemble of artificial ground motion time-series that are compatible with a given set of earthquake and site characteristics is presented. Acceleration time-series are modeled by a filtered white noise stochastic process with time-varying parameters. The stochastic model captures the main features of earthquake ground motions that influence structural responses, including the evolutionary intensity and the time-varying predominant frequency and bandwidth. Based on investigation of numerous recorded ground motions, predictive relations are developed that empirically link the stochastic model parameters to earthquake and site characteristics (e.g., faulting mechanism, earthquake magnitude, distance, and site conditions). These predictive relations facilitate random generation of the model parameters, which is the key to realistically representing the natural variability of ground motions for a given set of earthquake and site characteristics. Extensions of the model to simulate multiple components and near-fault ground motions with directivity effects are described. Finally, applications of the model in earthquake engineering, hazard analysis and risk assessment for infrastructure systems are highlighted.

Sanaz Rezaeian is a research structural engineer with a strong background in earthquake hazard analysis. She received her B.S. in Civil Engineering from the University of California, Berkeley in 2004. After working in the industry on design and rehabilitation of structural systems, she received her M.S. and Ph.D. from UC Berkeley in 2006 and 2010. As a doctoral student, Rezaeian focused on structural reliability, random vibrations, and simulation of earthquake ground motions. Immediately after graduation, she joined the Pacific Earthquake Engineering Research center (PEER), where she worked on modeling ground motion prediction equations. In 2011, Rezaeian joined the U.S. Geological Survey (USGS) as a Mendenall Fellow. Currently, she is working on the National Seismic Hazard Mapping project at the USGS in Colorado.