The Georgia Tech Chapter of Earthquake Engineering Research Institute
Presents
A seminar regarding

"Spatial correlation of earthquake ground motion intensities: measurement and implications for regional infrastructure risk"
**Jack W. Baker**
Assistant Professor, Stanford University
**(Mason 142, November 6, 2009)**
10:00 AM to 11:00 AM

Risk assessment of spatially distributed building portfolios or infrastructure systems requires quantification of the joint occurrence of ground-motion intensities at several sites, during the same earthquake. This talk will present an overview of techniques to quantify the needed joint distributions using observations from past earthquakes, and describe how these distributions can be used in probabilistic seismic risk assessments of spatially-distributed lifelines. Lifeline risk assessment presents challenges related to describing ground-motion intensity over a region, and related to the computationally expensive task of repeatedly analyzing performance of a lifeline system under many damage scenarios. A simulation-based framework will be presented that develops a small but stochastically-representative catalog of earthquake ground-motion intensity maps that can be used for lifeline risk assessment. The approach dramatically reduces required computational expense, while also maintaining a set of simulations that is consistent with all conventional probabilistic seismic hazard analysis calculations. The feasibility of the proposed approach is illustrated by using it to assess the seismic risk of a simplified model of the San Francisco Bay Area transportation network. A catalog of only 150 intensity maps is generated to represent hazard at 1,038 sites from ten regional fault segments causing earthquakes with magnitudes between five and eight.

Ground motion simulations
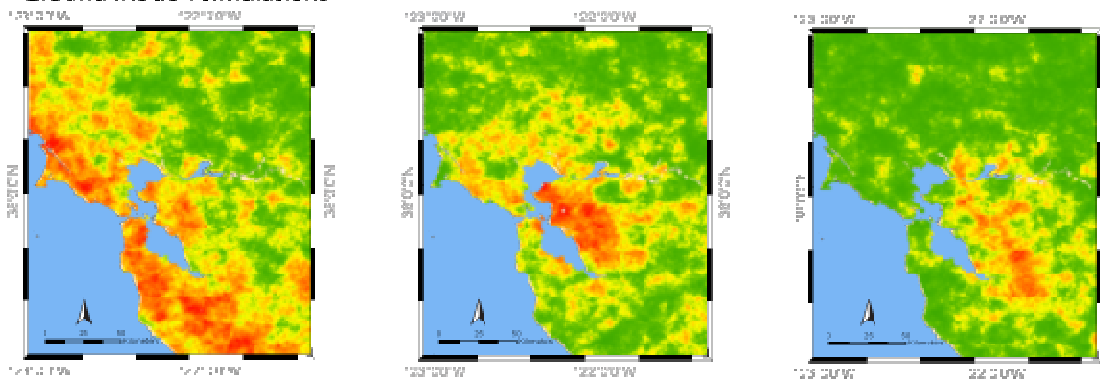
Travel time delay simulations
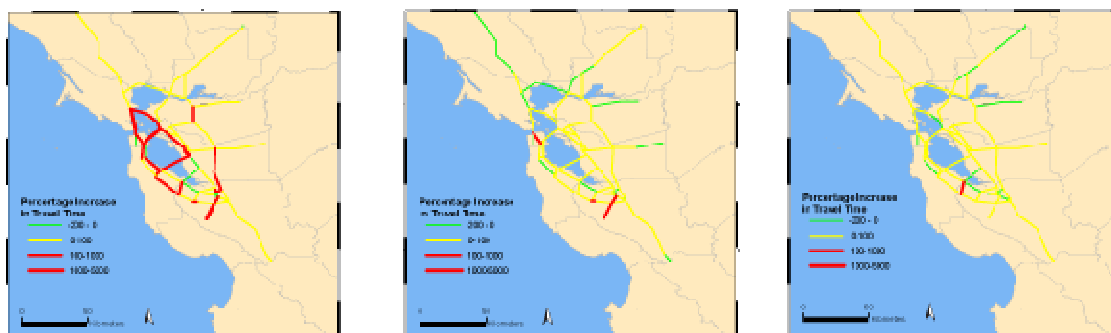
Biography

Dr. Baker is an Assistant Professor of Civil and Environmental Engineering at Stanford University. He joined Stanford in 2006, following a year at the Swiss Federal Institute of Technology (ETH Zurich), where he was a visiting researcher in the Department of Structural Engineering. He received his Ph.D. in Structural Engineering from Stanford University, where he also earned M.S. degrees in Statistics and Structural Engineering. His research focuses on the use of probabilistic and statistical tools for modeling of extreme loads on structures. He has industry experience in seismic hazard assessment, ground motion selection, and modeling of catastrophe losses for insurance companies.