From Ground Motion Selection Methodology to Multi-Hazard Sustainability

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Constructed on the framework of Performance-Based Earthquake Engineering, my PhD dissertation focuses on advancement of hazard-consistent ground motion selection methodology that links structural response to seismic hazard. In particular, I have refined the computation of the Conditional Spectrum, a target response spectrum that is consistent with Probabilistic Seismic Hazard Analysis, by incorporating multiple causal earthquakes and ground motion prediction models. Web applications related to this work include probabilistic seismic hazard deaggregation of ground motion prediction models (2009) and exact computation of the Conditional Mean Spectrum (2011) implemented in the US Geological Survey hazard mapping tools. In addition, I have selected ground motions for structural dynamic analysis based on the Conditional Spectrum for a range of buildings to investigate the impact of conditioning period and target spectrum on structural response estimates in both intensity-based and risk-based assessments. Engineering implications related to this work include recommendations to ASCE 7 building code and ATC-58 guidelines.

Inspired by earthquake engineering, my research has been extended to multi-hazard contribution to dam failure and Probabilistic Sea-Level Rise Hazard Analysis, a novel framework that accounts for aleatory uncertainties from emission scenarios and epistemic uncertainties from prediction models. Believing that the built environment must remain resilient under multiple hazards and sustainable in the face of climate change, my future research aims to address site- and building-specific probabilistic multi-hazard analysis, multi-component performance-based design and assessment schemes, as well as multi-scale strategic planning for mitigation and adaptation.

Speaker Bio: Ting Lin is a PhD candidate at Stanford University working with Prof. Jack Baker on ground motion selection methodology funded by USGS, PEER and ATC. She completed her Bachelor of Science in Civil Engineering with Honors and a concentration in Architecture from Cornell University, and Master of Science in Structural Engineering from Stanford University. Prior to joining Stanford, she worked with Prof. Tom O’Rourke, Prof. Harry Stewart and Dr. Mike Palmer on NSF/NEES lifeline research at Cornell, and Dr. Les Robertson on structural design at LERA. She is looking forward to “building a safer (and sustainable) tomorrow... today” together with the committed faculty and students at Notre Dame.