

Project Title: Regional Scale Simulation of Uncertain Response of Transportation Infrastructure Soil-Structure Systems

Project # 191-NCTRJE

Principal Investigator

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Research Team

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Abstract

Seismic motions that affect transportation system, a soil-structure systems (SSI), do propagate from the source/fault, through deep and shallow rock, and near surface soil to the locations of interest. There are a number of sources of uncertainty in modeling of seismic response of SSIs. Uncertain seismic sources, uncertain properties of deep and shallow rock and uncertain properties of soil all contribute to significant uncertainty in resulting response of SSIs. Modeling of uncertain response of SSIs over a region requires an approach that takes into account different site conditions at locations of interest and different seismic scenarios, i.e. different combinations of magnitude M_i and distance R_i and corresponding occurrence rates $\lambda_i(M_i, R_i)$.

Deliverables

Research team will deliver a PEER report and a number of conference and journal papers describing developed methodology and the main results. In addition, developed methodology will be demonstrated for select transportation infrastructure systems.

Research Impact

The main impact of developed methodology and examples will be in providing researchers, practicing engineers and regulators with methodology and tools to assess seismic risk using novel analytic approaches, without a need to decide what Intensity Measures (IMs) to use. Moreover, methodology can be easily extended to include risk assessment for soil and/or structure systems resulting from other non-seismic loading scenarios.

Project Image.

Illustration of risk analysis methodology is shown in figure below.

