Earthquake Soil Structure Interaction Modeling and Simulation using Real ESSI Simulator

Boris Jeremic, UCD, LBNL;
Jose Abell, UCD;
Yuan Feng, UCD;
Sumeet Kumar Sinha, UCD;
Maxime Lacour, UCD;
Han Yang, UCD;
Fatemah Behbehani, UCD;
David McCallen, UCOP, LBNL

Earthquake Soil Structure Interaction (ESSI) modeling and simulation requires sophisticated modeling of soil, structure and ground motions. Presented will be current status of the Real ESSI Simulator program. The Real ESSI Simulator is developed at UCD and LBNL under auspices of DOE, for high fidelity modeling and simulation of seismic response of soil structure nuclear facilities systems. Details of modeling of nonlinear/inelastic soil, nonlinear/inelastic contact and nonlinear/inelastic structure, will be provided and illustrated on a number of examples. In addition, development of realistic seismic motions, encompassing full 3D wave fields, with body and surface waves, as observed in real earthquakes, will be described in some details as well. Both deterministic and probabilistic models and simulations are developed and pursued.

Full verification suite will be described in some detail as well. Validation suite is currently being developed in collaboration with the UNR, where a large scale soil box is being designed (in part using Real ESSI simulator) for validation experiments.

A number of examples will be used to illustrate Real ESSI capabilities.