University at Buffalo
Department of Civil, Structural and Environmental Engineering
School of Engineering and Applied Sciences

ENGINEERING SEMINAR

Full-Scale Hybrid Simulation of Soil-Foundation-Structure-Interaction in a Geotechnical Laminar Box

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Abstract

Soil-Foundation-Structure-Interaction (SFSI) is a necessary consideration in the design of multi-hazard resilient infrastructure. Laboratory studies of SFSI at an element scale or reduced-scale are challenging as realistic boundary conditions are not replicated appropriately, and the response of integrated sub-systems and agglomerated soils are prone to scaling issues, particularly when pore fluid is present. Large-scale testing with real-time dynamic hybrid simulation is a useful tool for characterizing SFSI effects. By increasing knowledge of the fundamental physics and parameters that drive SFSI phenomena, new and existing high-risk facilities will be better analyzed and designed (or retrofitted) to achieve target performance goals at the component and systems levels.

The Geotechnical Laminar Box at the University at Buffalo (UB) was used to create a large-scale model of a liquefiable soil column and pile foundation system, upon which a hybrid shake table was installed. The parametric experimental program included three inputs: base motions, superstructure only motions, and hybrid scenarios involving the base and superstructure. More than 150 seismic events were executed on the large-scale model to characterize the response of the soil-structure system. Novel sensing technologies were employed to identify the state of the soil and soil-foundation system between successive seismic events. The research produced positive initial findings of the hybrid SFSI setup and identified areas for further research.

Date: Friday, September 15th, 2017 Time: 11.00 am
Location: 140 Ketter Hall, North Campus, University at Buffalo