VERIFICATION OF RTHS

US-China Partnership: Verification of Real-Time Hybrid Simulation through Shake Table Comparison

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BOWEN LABORATORY

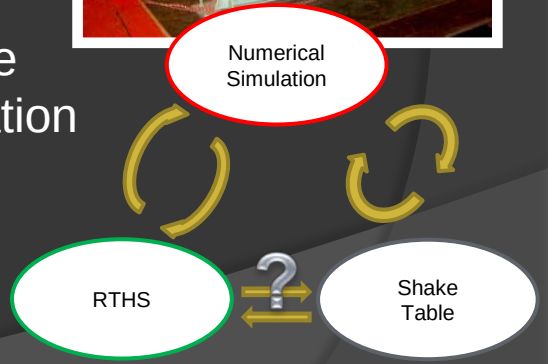
ISL Intelligent Infrastructure Systems Laboratory

PURDUE UNIVERSITY

Research Objectives

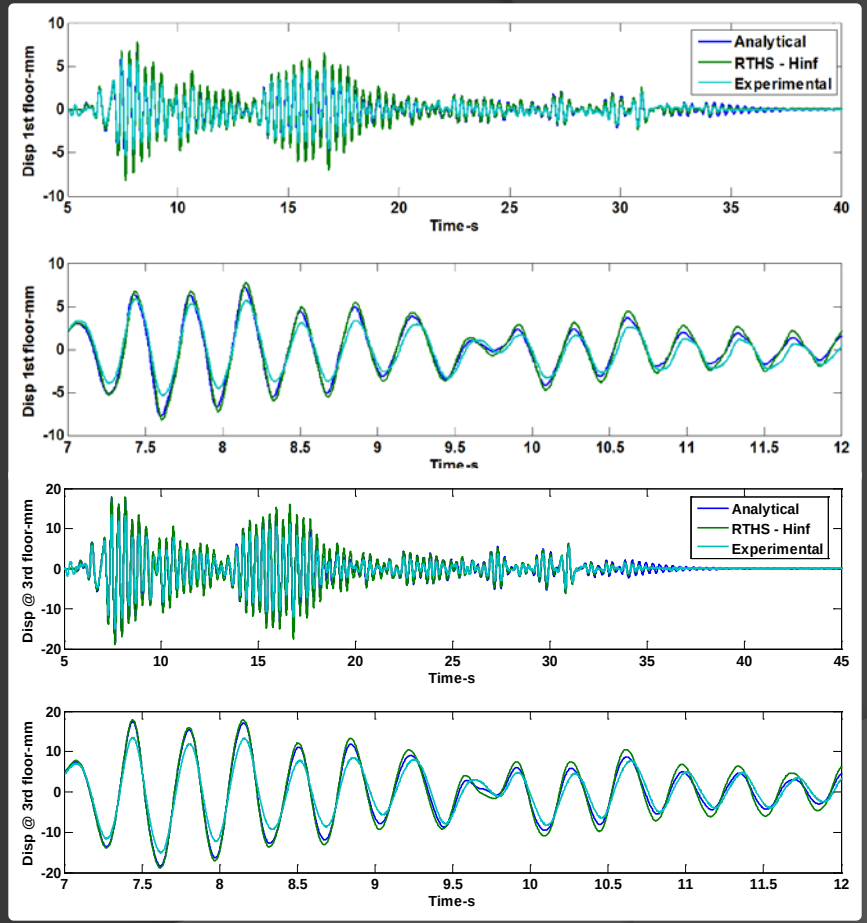
- Validation through comparisons between experiments, analytical simulations and RTHS using mid-scale structures.

- This international (US-China) research project focuses on the following tasks:
  - Identification and modeling of a 3-story test structure
  - Development of control algorithms for hazard mitigation
  - Testing of the structure on the shake table
  - Conducting RTHS tests where an MR damper is acting as the physical substructure
  - Verification of the RTHS method



Research Findings

- First phase:
  - System identification performed on the prototype structure at Harbin Institute of Technology (HIT)
  - Preliminary semi-active control designs completed
- Second phase:
  - Testing of the structure on the shake table located at HIT when MR damper is on and off the structure.
- Third phase:
  - RTHS testing on MR damper using 2500 kN actuator located at HIT
  - Comparison of Shake Table – Numerical Simulation - RTHS



US-China: Verification of Real-Time Hybrid Simulation through Shake Table Comparison

Real-time hybrid simulation (RTHS) provides researchers the opportunity to isolate and physically investigate only the more complex or critical components, while numerically including the remainder of the structure. This approach allows for a wide range of configurations to be tested using a single test specimen. This work present the results of a three phase project focusing on comparison of analytical simulation, physical full-scale tests and real-time hybrid simulation tests of a medium-scale prototype structure under various earthquake inputs.

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