

Hybrid Simulation Workshop: Day 1 Review

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The George E. Brown, Jr. Network for Earthquake Engineering Simulation



Hybrid Simulation

- ◆ Hybrid simulation is an experimentally based method for investigating the response of structure to dynamic excitation using a hybrid model
- ◆ A hybrid model is a an assemblage of one or more physical and one or more numerical, consistently scaled, substructures
- ◆ The equation of motion of a hybrid model under dynamic excitation is solved during a hybrid simulation test

Hybrid Simulation Basics

◆ Sub-structuring:

- The main idea

◆ Similitude

- Fundamental principle

◆ Integration methods

- Time-stepping without reversals

◆ Errors and accuracy

- How good is your test?

OpenSees Framework

- ◆ Powerful framework for structural analysis, that is transparent and (easily) extensible and scaleable
- ◆ OpenFRESCO implementation:
 - Object-oriented, based on OpenSees
 - Integrates physical and computer elements into a common domain
- ◆ MTS hardware
- ◆ OpenSees Navigator user interface

Preview: Day 2

◆ Hands-on: Part 1

- Develop your own example
- Hybrid test #1

◆ OpenSees modeling and simulation

◆ Hands-on: Part 2

- Data and video at *nees@berkeley*
- Hybrid test #2

◆ Hybrid simulation

- Review and new directions

Thank you!

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Contributions to this presentation from xxx are gratefully acknowledged.



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