# 5TH MECHS WORKSHOP:

## EXPLORING MULTI-HAZARD AND MULTI-PHYSICS HYBRID SIMULATION

**AUGUST 9-10, 2023**

**PURDUE UNIVERSITY**
**WEST LAFAYETTE, IN**

This workshop will give participants a place to share the most recent advances in hybrid simulation for structural testing, to join in research discussions, and to explore potential partnerships with the industry sector.

To be eligible for travel fellowships, participants must travel within the US and be affiliated with a US academic institution.

## IMPORTANT DATES

- **June 23**
  Travel funding requests due
- **July 12**
  Registration ends
- **August 8**
  Activities for those new to hybrid sim
- **August 9-10**
  Workshop

## REQUEST TRAVEL FUNDS?

Please visit the website to express interest or request funds:

bit.ly/MECHS2023

or scan the QR code:

## ACTIVITIES

Technical discussions on the latest developments in hybrid simulation

Networking to explore opportunities in implementing hybrid simulation methods to tackle new problems

Emerging trends and future directions in hybrid simulation for industrial applications.

Hands-on activities and case studies shared that used hybrid simulation testing

This research coordination network in Hybrid Simulation for Multi-hazard Engineering is supported by a grant from the National Science Foundation (#1661621)

Multi-hazard Engineering Collaboratory on Hybrid Simulation (MECHS)

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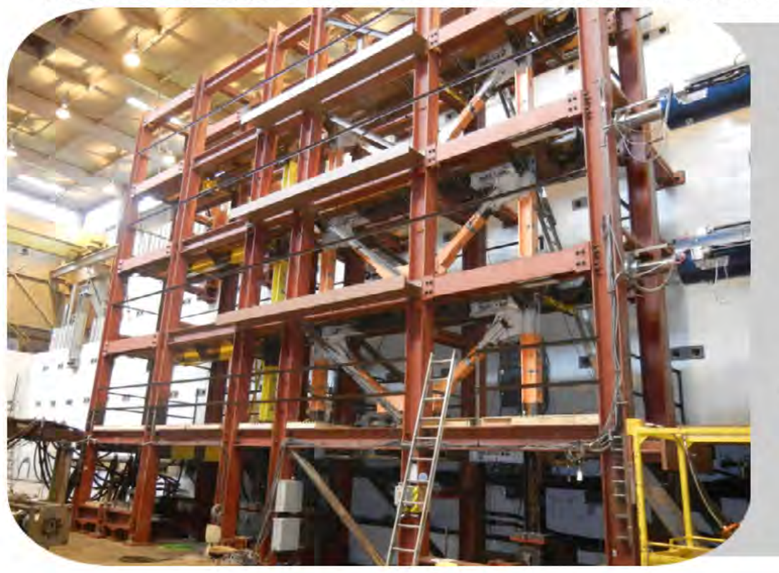
# HYBRID SIMULATION APPLICATIONS

## LARGE-SCALE REAL-TIME HYBRID SIMULATION OF BUILDINGS WITH ADVANCED DAMPERS



- Real-time hybrid simulation and large-scale testing are combined to evaluate performance of buildings with advanced structural damping systems, like magnetorheological dampers, for seamless implementation in real-world applications such as steel frames.
- This offers the industry access to groundbreaking testing methods that enables design procedures to be developed to achieve exceptional structural performance and resilience.

**(PURDUE, UIUC, LEHIGH, 2010)**

## REAL-TIME AEROELASTIC HYBRID SIMULATION

- Innovative approach for wind tunnel testing of high-rise buildings that combines numerical simulation with physical wind tunnel tests.
- By accurately representing the structural properties numerically and incorporating physical elements, engineers can assess and optimize the performance of high-rise structures more effectively.

**(UNIVERSITY OF TORONTO, 2020)**

## HYBRID FIRE SIMULATION

- Heat transfer analysis was applied to accurately predict the behavior of a simulated 4-story numerical frame with a physical steel column, offering a more realistic assessment of fire performance in structural design and a cost-effective alternative to full-scale fire testing.
- It has potential applications for simulating challenging structural components and accommodating multiaxial loading in future developments.

**(UNIVERSITY OF TORONTO, 2018)**

## REAL-TIME HYBRID SIMULATION OF BUILDING PIPING SYSTEMS

- Examined the multi-directional seismic performance of a nonstructural piping system in a simulated 3-story building structure, showing excellent performance in pipe groove coupling joints and seismic bracing without damage or pressure loss.
- Highlights the effectiveness of RTHS in evaluating nonstructural components, providing practical tools for developing performance-based design criteria and improving seismic resilience.

**(LEHIGH UNIVERSITY, 2008)**

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