

AIMS² Research Project for Fall 2019 – Spring 2020

Title of Project: Structural Earthquake Engineering Research: Hands-On Study of Passive Damping Mechanisms

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Project Description

Passive damping mechanisms are common components used to damp out oscillations during earthquakes in modern buildings. This project will focus on exploring resonance modes, measuring accelerations with wireless sensors and demonstrating passive damping with a complete structures experiment.

A building tower will be made to oscillate in its various resonance modes. Wireless accelerometers are attached to each floor to record how much shaking each floor experiences. A damping pendulum will be installed on top of the tower. The performance of the tower will be observed, recorded and analyzed.

Goals and Objectives of the Project

- (1) Introduce fundamental theory of vibrations,
- (2) Learn techniques used in the measurement of vibration responses,
- (3) Become familiar with digital data acquisition systems,
- (4) Apply theories learned in engineering mechanics and dynamics, and
- (5) Conduct experiments and analyze and interpret data.

Expectations

Student research assistants are expected to:

- Attend weekly meetings and to work 8 to 10 hours per week,
- Present their work in the AIMS² Research Symposium (early Fall 2020, TBA),
- Have strong fundamental engineering background, such as Statics and Mathematics,
- Have computer aided graphic skill, and
- Be willing to learn while learning and think deeply about this project.

Outcomes

Through this project students will:

- (1) Develop research skills such as an ability to find and review technical articles to get needed information,
- (2) Be engaged to engineering problem-solving steps, and
- (3) Enhance their oral and written communication skills (i.e., create a poster, prepare Power Point slides, present orally).