17117 - Development and System-Level Implementation of Novel Damping Devices

Project Title

Development and System-Level Implementation of Novel Damping Devices

Research Team

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Project Description

This project aims to address the development and system-level integration of supplemental energy dissipation devices into low damage structures. The objectives involve the development of novel smart-design viscous fluid dampers which provide customisable, displacement and direction dependent dissipation in a passive device, previously only available in semi- or fully active devices. Displacement and direction dependent dissipation enables modification of the overall structural hysteresis response. The devices will be experimentally tested and then modelled in multi-level structures to understand the impact of the devices on the response of case-study structures.

Experimental validation will hopefully include use of these devices in a large-scale bi-directional dynamic test at the International Joint Research Laboratory for Earthquake Engineering (ILEE) facilities in Shanghai. This large-scale system-level test will also experimentally validate the important connections and detailing necessary to assure effective incorporation of these devices into a multi-axis whole-of-building dynamic test.

Finally, the research team will work with practitioners (locally and internationally) to investigate impediments and incentives for field deployment and develop a collaborative project to promote wider uptake of new devices and design methods.

Key Objectives

The key objectives of this project are as follows:

- **Development of Displacement and Direction Dependent Damping Devices –** additional configurations, modified hysteretic behaviour and new damping fluids to produce linear and non-linear velocity response.
- **Integration of Damping Devices into a Large-Scale Shake-Table Test –** inclusion of the device developed into the QuakeCoRE-ILEE shake table test at Tongji university in Shanghai
- **System-Level Implementation of Damping Devices – Assessment with Practitioners –**work with practitioners on the design and detailing strategies to inclusion of novel damping devices into low-damage structures.