

# **VIBRATION CONTROL-ACTUATOR AND SENSOR PLACEMENT USING MODAL APPROACH – SOME EXPERIMENTAL INVESTIGATIONS**

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## **ABSTRACT**

Application of control technologies to structure is expected to be able to enhance a structural performance in response to natural hazards. Specifically, smart base isolation system which consist of a semi-active isolator at the base with controllable semi devices attract much attention for efficacy and economical reasons. Focuses on the development of control design strategies using physical knowledge of system dynamics that had not been investigated systematically and applied for civil structures previously. Structural characteristics that are helpful to disclose structural properties, yet are often ignore by civil engineers are integrated with those control techniques in both nodal and modal co-ordinates to construct indices for the determination of the control action to take full advantage of their capabilities. A 3D isolated building model is employed with Magneto Rheological dampers are used as smart control device. IEPE piezoresistive Actuator and Force transducers are used with Deltatron conditioning amplifier.

A large number of techniques for the optimal placement of sensors and actuators in a vibration control system have been developed in recent years. Many of these methods are based on the concept of controllability observability. Changing the configuration of actuators and sensors can shape controllability and observability properties. This is an optimization problem that is closely related to achieving high performance with minimal cost. The establishment of explicit relationships between controllability and observability and vibration modes facilitates this approach. The experimental investigation employ the use of IEPE uniaxial accelerometers and triaxial accelerometer (Bruel & Kjaer make) along with force transducers; mounted at different trial locations on the model structure to measure the absolute accelerations and damping force of the structure and rheological dampers respectively, mounted in the system, upon the excitation of structure.

This research paper explains the details of experimental work done out of the sponsored research project, proposes a controllability – observability – based approach for effective place control devices and sensors.

**KEYWORDS:** Actuators and Sensors, Earth Quake Hazards Mitigation, Modal Approach, Semi – Active Isolation, Vibration Control