

Earthquake vibration control for buildings with inerter networks

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Abstract

This paper investigates the performance benefits of building suspension systems employing a newly developed mechanical element, called an inerter. The inerter was proposed as a genuine two-terminal mechanical device to substitute for the mass element to improve performance of mechanical systems. This study applied inerters to building suspension control. We apply three inerter layouts and four historical earthquake data to a simple one-DOF building model to illustrate how inerter can improve its suspension performance. The simulation results demonstrate the effectiveness of inerters in suppressing earthquake vibrations. In addition, the mechatronic inerter is able to adjust the system impedance for specific earthquakes.