

## **A Semi-active piezoelectric friction damper**

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### **Abstract**

This research investigates the development of a semi-active piezoelectric friction damper for controlling the seismic response of large-scale structures. The proposed device is made of Duplex steel and leads to high friction capacity, which can be developed either in passive or semi-active modes. For the later, piezoelectric actuators react against a stiff clamping system and apply a variable normal force on the multiple contact surfaces. To validate the design, a prototype, which contact surfaces were made of stainless steel and brake pad material, was built and tested in both friction modes. Moreover, an analytical model of the damper was developed to estimate the performance of the piezoelectric actuators within the clamping system. Experimental results showed that the proposed device achieves a force range factor of 1.9. These experimental results also compare well with those obtained from the analytical model of the damper.