

عنوان مقاله:

Vibration Control of Chaotic Systems with Magneto-Rheological Tuned Liquid Column Dampers

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خلاصه مقاله:

In this article an analytical dynamic model of a cart-liquid damper's chaotic behavior has been derived. The cart is attached to a fixed support through a non-linear spring and a linear viscous damper. In most recent works Tuned Liquid Column Dampers (TLCDs) has been used to control chaotic vibrations. Tuned liquid column dampers are U-tubes filled with some liquid, acting as a vibration damper in structures of engineering interest like buildings and bridges. In this research a new control device, magneto-rheological tuned liquid column damper (MR-TLCD), is proposed as a vibration control device. It combines the benefits of magneto-rheological smart materials and tuned liquid column dampers. The magneto-rheological (MR) fluids can reversibly change from a free-flowing, linear viscous fluid to a semi-solid with controllable yield strength in milliseconds when exposed to a magnetic field. A mathematical model of the devised MR-TLCD is first established using the parallel-plate theory and then its results are compared with ordinary TLCD systems. MR-TLCDs with optimal parameters are capable of achieving much better vibration mitigation capability than conventional TLCD system. The most important purpose of using MR-TLCDs is converting the chaotic vibration to a periodic one. Another purpose of using TLCD or MR-TLCD is to reduce the amplitude of the cart vibration.

کلمات کلیدی:

chaotic vibration control; Magneto-Rheological Tuned Liquid Column Damper (MR-TLCD); vibration mitigation

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