# Hysteretic Tuned Mass Dampers for Seismic Protection

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## Abstract

Conventional linear tuned mass dampers (TMDs) are recognized as useful device to mitigate wind-induced vibrations in civil structures whereas their effectiveness in seismic protection still represents an open issue. The main shortcoming is related to the loss of tuning, or *detuning*, due to changes in the structural stiffness that may occur in construction materials characterized by a strong nonlinear response even at relatively low excitation levels, as well as after the onset of plasticity or damage.

To cope with such a limitation in linear TMDs, therefore, the present study investigates numerically the seismic performance of a new nonlinear vibration absorber. To this end, the behavior of the protected system is here simulated through a hysteretic constitutive model (Boccamazzo, Carboni, Quaranta and Lacarbonara (2018)) and a vibration absorber that exhibits a hysteretic restoring force with pinching is considered (Carboni, Lacarbonara and Auricchio (2015)). The main system parameters are evaluated considering the experimental data previously collected by Carboni and Lacarbonara (2016) for a reduced-scale five-storey building model. The parameters of the hysteretic TMD are optimized numerically and its performance is carefully evaluated, also through a comparison with that of a conventional linear absorber.

## References

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