# Seismic response control in buildings via passive energy dissipative devices

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## ABSTRACT

Passive dissipative energy methods have been developed, not only to protect the integrity of the structures themselves, but to protect and provide greater security to the users of these in the presence of seismic phenomena at a lower cost compared with semi-passive and active control methods.

This aim of this paper is to present the numerical modelling of hysteretic energy dissipation devices as an effective and robust system control for the seismic response in buildings. This proposal is based in a continuum damage model in the framework of a large strain elasto-plastic model in order to characterize the plasticity and degradation of these yielding damper plates. The present algorithm establishes an easy methodology to evaluate different configuration of dissipative joints through the structure in order to increase the energy damping ability of the system by the optimum placement of the plates minimizing the effects caused in the structure by seismic events.

A set of different cases, multi-story multi-bay buildings, were selected and the response is evaluated with and without passive energy dissipative devices; the numerical response is compared with experimental tests as given in Ref. [1] and [2]. The conclusions are drawn upon energy criterion – the ratio of the hysteretic energy to input energy is compared for different structural configurations.

## REFERENCES

[1] F. Perri, C. Faella, and E. Martinelli, *Cost-competitive hysteretic devices for seismic energy dissipation in steel bracings: experimental tests and low-cycle fatigue characterization*, Construction and Building Materials, Vol. 113, pg. 57-67, (2016).

[2] D.R. Teruna, T.A. Majid, and B. Budiono, *Experimental Study of Hysteretic Steel Damper for Energy Dissipation Capacity*, Advances in Civil Engineering, Vol. 2015, Article ID 631726, 12 pages, (2015).