

Optimal Configuration of Viscous Dampers Connected to Adjacent Similar Buildings Using Particle Swarm Optimization

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Abstract

Controlling the seismic response of adjacent buildings coupled with straight damper configuration is efficient when the buildings have different dynamic properties. If the dynamically similar buildings are connected with straight dampers, this method will become inefficient. So, the configurations other than the straight connection have to be used in case of adjacent similar buildings. It is not necessary to connect dampers on all floors, but there exists an optimal location. When the dampers are provided at optimal locations, then the response reduction is almost comparable to that of building with dampers provided at all the floors. This will save the cost of dampers required to reduce the seismic response of the buildings. In this study, one of the nature-inspired optimization approaches, particle swarm optimization (PSO), is used for the optimal configuration of viscous dampers to connect ten-storied adjacent similar RC buildings. The present study shows that the provided optimal dampers reduce the dynamic response of both the buildings simultaneously, instead of providing dampers for each building separately.

Keywords

Dynamically similar building Viscous damper Particle swarm optimization Optimal damper configuration
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Notes

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References

1. Daisuke, A., John, E.B., Stefano, B.: Design optimization of passive devices in multi-degree of freedom structures. In: 13th World Conference on Earthquake Engineering, Canada, Paper No. 1600, 1–6 August 2004
[Google Scholar](#)
2. Athanassiadou, C.J., Kappos, A.J., Penelis, G.G.G.: Seismic response of adjacent buildings with similar or different dynamic characteristics. *Earthq. Spectra* **10**(2), 293–317 (1994)
[CrossRef](#)
[Google Scholar](#)

4. Matsagar, V.A., Jangid, R.S.: Viscoelastic damper connected to adjacent structures involving seismic isolation. *J. Civ. Eng. Manag.* **11**(4), 309–322 (2005)
[CrossRef](#)
[Google Scholar](#)
5. Tande, S.N., Krishnaswamy, K.T., Shinde, D.N.: Optimal seismic response of adjacent coupled buildings with dampers. *J. Inst. Eng. Civ. Eng. Div.* **90**(Nov), 19–24 (2009)
[Google Scholar](#)
6. Makita, K., Christenson, R.E., Asce, M., Seto, K., Watanabe, T.: Optimal design strategy of connected control method. **133**(12), 1247–1257 (2008)
[Google Scholar](#)
7. Bigdeli, K., Hare, W., Nutini, J., Tesfamariam, S.: Optimizing damper connectors for adjacent buildings. 1–25 (2015)
[Google Scholar](#)
8. Hadi, M.N.S., Uz, M.E.: Improving the dynamic behaviour of adjacent buildings by connecting them with fluid viscous dampers. *Building*, no. June, 22–24 (2009)
[Google Scholar](#)
9. Taylor, P., Patel, C.C., Jangid, R.S.: Seismic response of dynamically similar adjacent structures connected with viscous dampers. *IES J. Part A: Civ. Struct. Eng.*, no. December 2014, 37–41 (2010)
[Google Scholar](#)
10. Yang, X.: *Nature-Inspired Optimization Algorithms* (2014)
[Google Scholar](#)
11. Zahrai, S.M., Akhlaghi, M.M., Rabipour, M.: Application of Particle Swarm Optimization for improving seismic response of structures with MR dampers. In: *Proc. Int. Conf. Noise Vib. Eng. ISMA 2012*, no. November 2014, pp. 441–448 (2012)
[Google Scholar](#)
12. Indian Standard code: Earthquake resistant design of structures. Part-1, 1893–2016
[Google Scholar](#)

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