

SEISMIC PROTECTION OF MULTI-DRUM COLUMNS WITH THE USE OF PARTICLE DAMPERS

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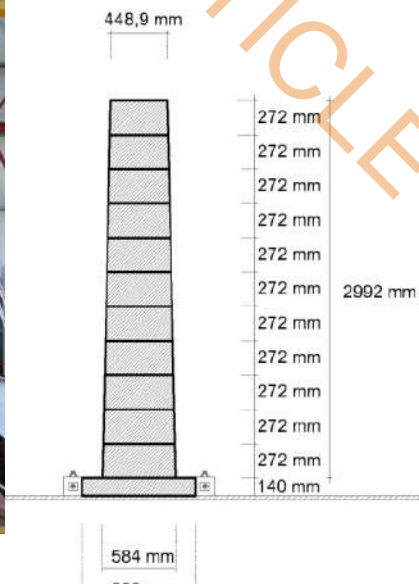


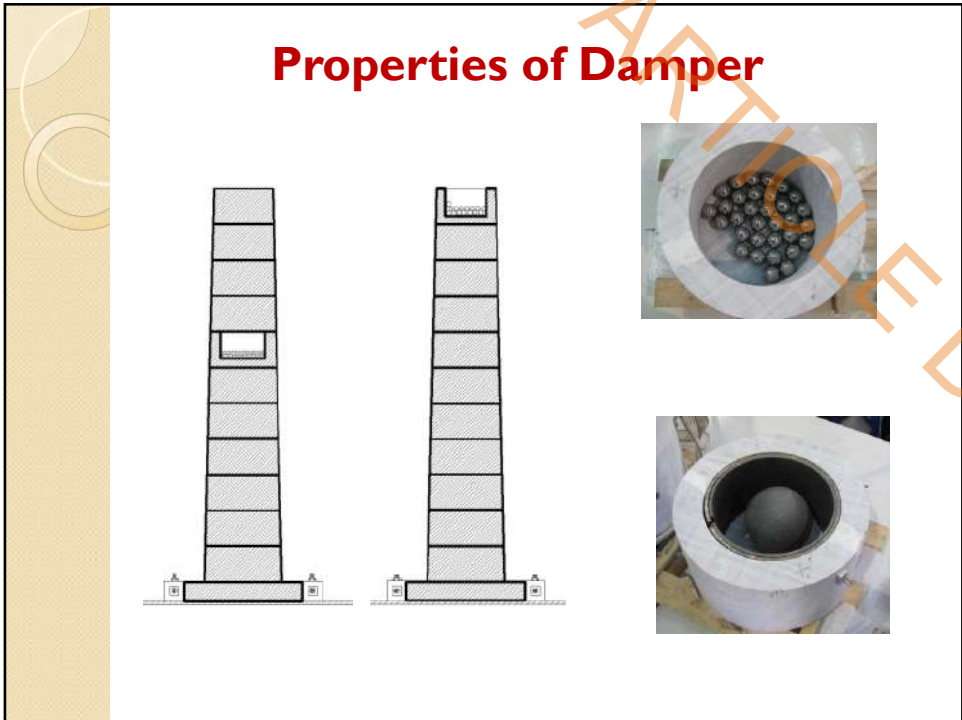
MULTI-DRUM COLUMNS-PARTICLE DAMPER

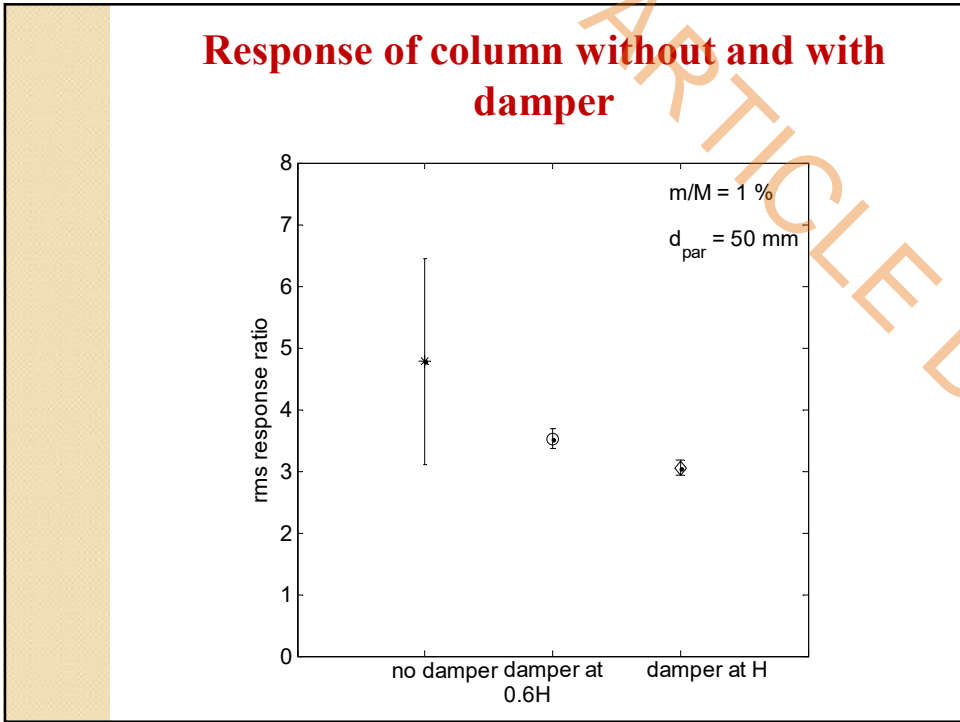
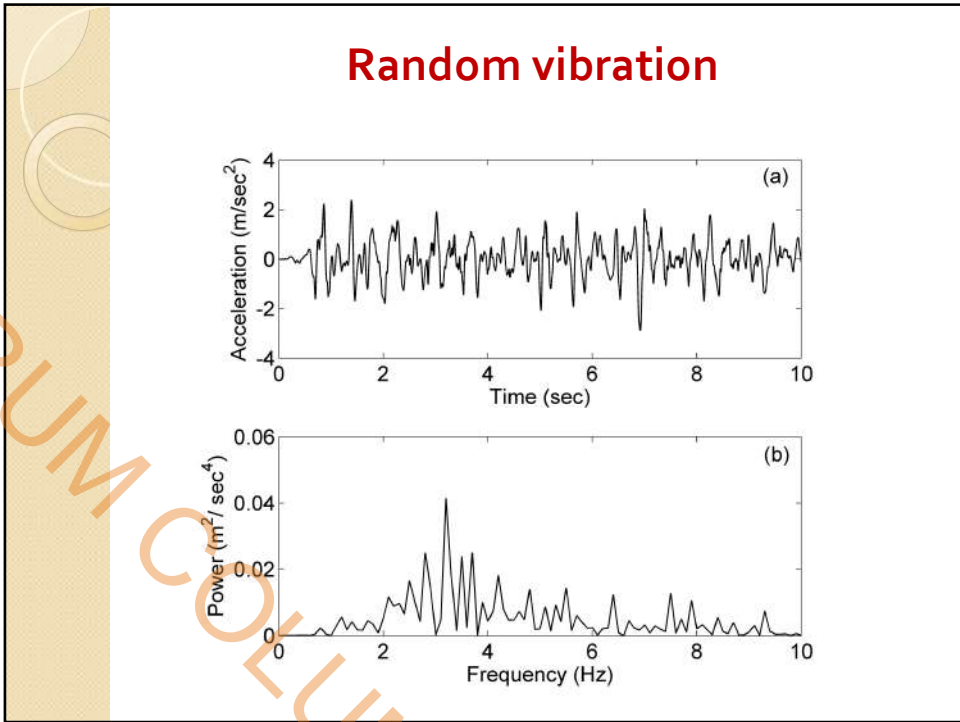
Specimens



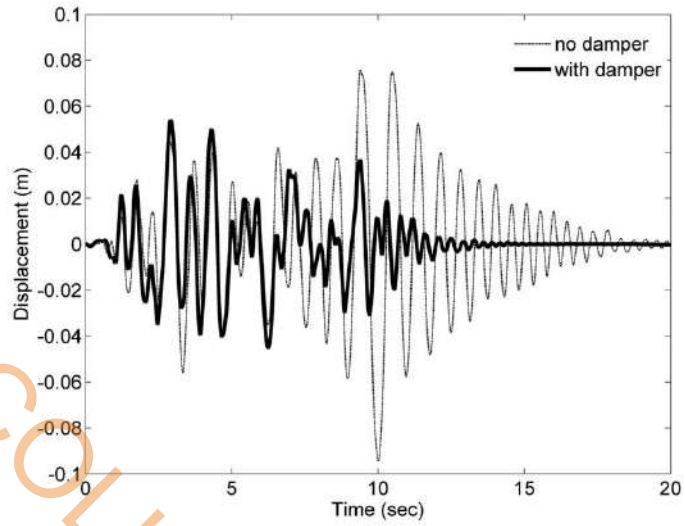
Dimensions of Big Column



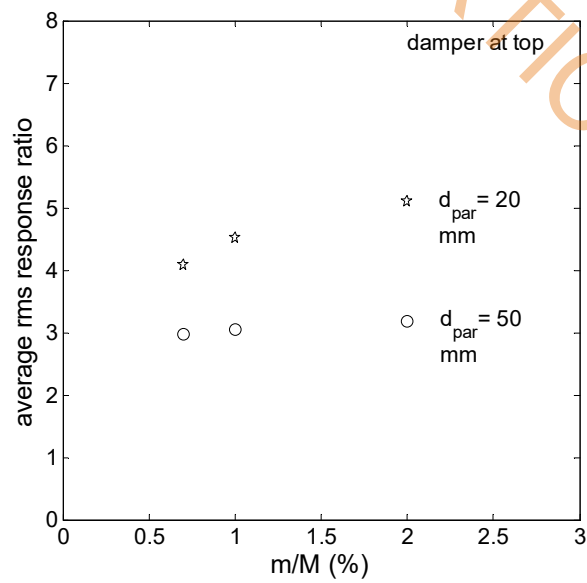




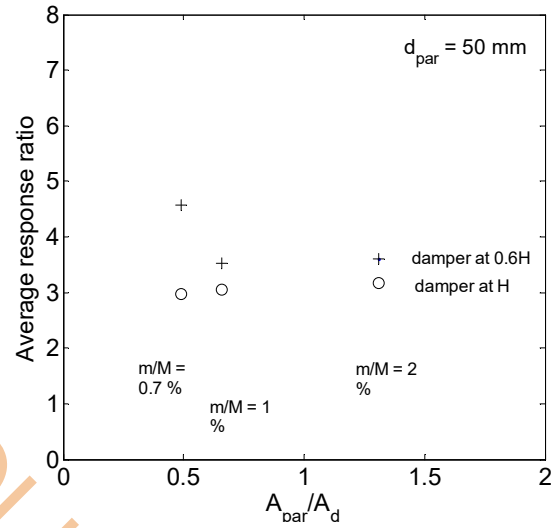
Response under random excitation



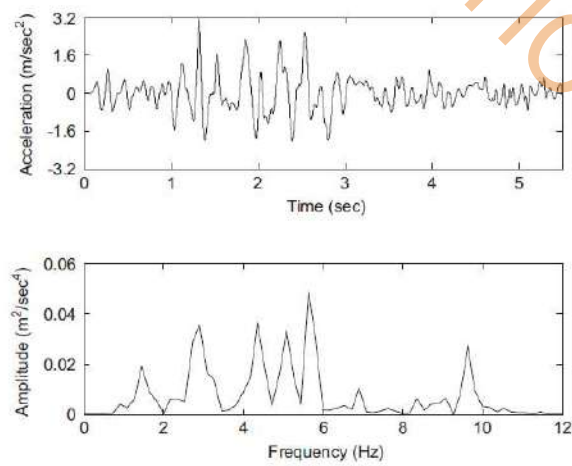
Influence of mass ratio



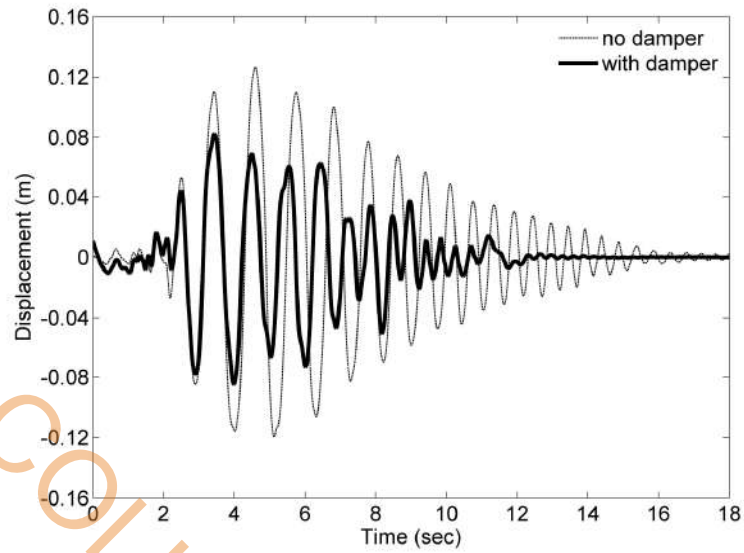
Influence of damper's size



Earthquake excitation



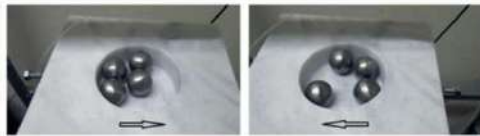
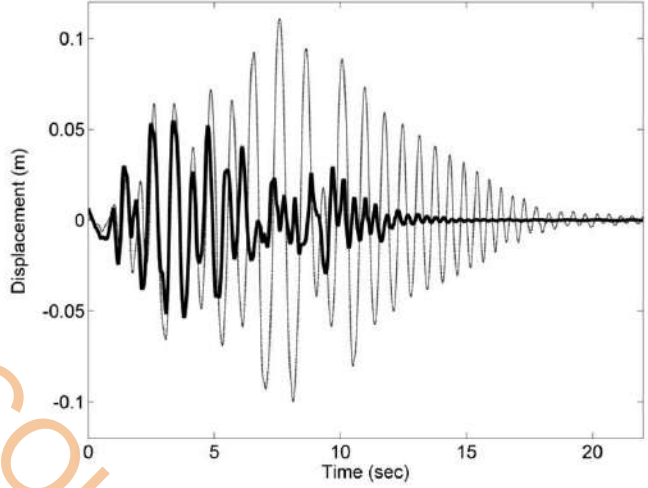
Response under earthquake excitation

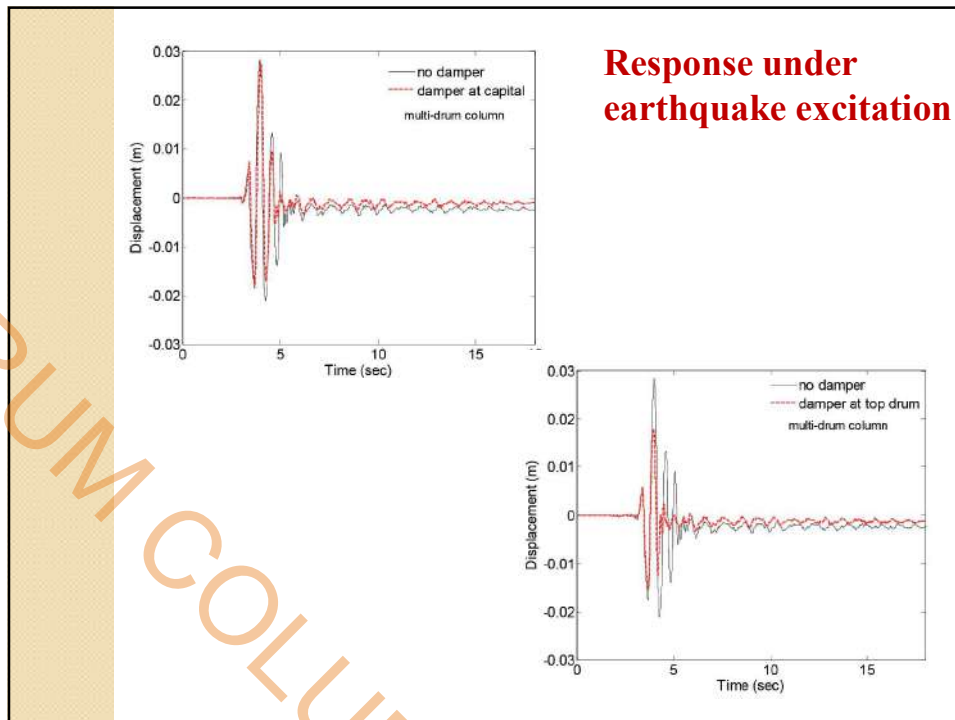


Column under 2% inclination



Displacement of inclined column's top drum under random excitation





Conclusions

- Particle dampers can be effective in reducing the response of multi-drum columns to dynamic excitations without altering the appearance of the column.
- The particles need enough space to move to obtain the momentum needed to exchange it with the momentum of the primary system.
- A small mass ratio can give up to 50% reduction of the response.

Related Publications

Journal Papers

- Baros D.K., Papalou A. (2019). "Parametric Analysis of the Dynamic Response of Multi-Drum Columns", *Journal of Earthquake Engineering*, Vol. 25(14), doi.org/10.1080/13632469.2019.1657986
- Papalou A. (2018). "The effect of particle damper's position on the dynamic response of classical columns", *Periodica Polytechnica Civil Engineering*, Vol. 62(1), pp. 56-63, <https://doi.org/10.3311/PPci.10286>
- Papalou A. and Strepelias E., (2015). "Effectiveness of Particle Dampers in Reducing the Monuments' Response under Dynamic Loads", *Mechanics of Advanced Materials and Structures*, Vol. 23(2), 128-135.
- Papalou A., Strepelias E., Roubien D., Bousias S. and Triantafillou T. (2015). "Seismic Protection of Monuments Using Particle Dampers in Multi-Drum Columns", *Soil Dynamics and Earthquake Engineering*, Vol. 77, 360-368.
- Papalou A. and Strepelias E., (2015). "Control of the Dynamic Response of Classical Columns with Defects", *Periodica Polytechnica Civil Engineering*, Vol. 59(3), 303-308.
- Papalou A. and Strepelias E., (2014). "Structural Control of Monuments' Response under Sinusoidal Excitation using Particle Dampers", *Open Construction and Building Technology Journal*, Vol. 8, 351-356.

Conference Papers

- Papalou A., Roubien D., Triantafillou T., and Strepelias E. (2015). "A passive control methodology for seismic safety enhancement of monumental structures", *SPIE, Smart Structures NDE*, March 2015, San Diego, USA.
- Papalou A., Strepelias E., Roubien D., Bousias S. and Triantafillou T. (2014). "Vibration Control of Classical Columns Using Particle Dampers", *ISMA International Conference on Noise and Vibration Engineering*, September 2014, Leuven, Belgium ([indexed in Scopus](#))
- Papalou A., Strepelias E., Roubien D., Bousias S. and Triantafillou, T (2014). "Seismic Reduction of Monuments' Response Using Particle Dampers", *6th World Conference on Structural Control and Monitoring*, July 2014, Barcelona, Spain.
- Papalou A. and Strepelias E. (2014). "The Influence of Particle Dampers on the Response of Ancient Monuments", *9th International Symposium on the Conservation of Monuments in the Mediterranean Basin*, June 2014, Ankara, Turkey.

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