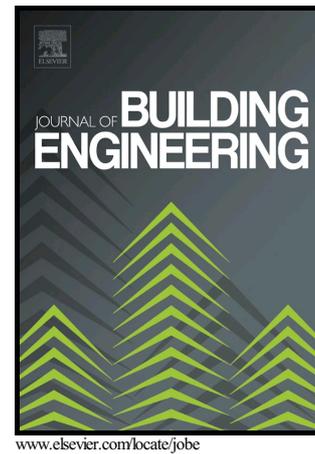


Author's Accepted Manuscript

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PII: S2352-7102(17)30067-0
DOI: <https://doi.org/10.1016/j.job.2017.11.005>
Reference: JOBE352

To appear in: *Journal of Building Engineering*

Received date: 2 February 2017
Revised date: 3 November 2017
Accepted date: 4 November 2017

Cite this article as: Said Elias and Vasant Matsagar, Wind RESPONSE Control of Tall Buildings With Single Tuned Mass Damper, *Journal of Building Engineering*, <https://doi.org/10.1016/j.job.2017.11.005>

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WIND RESPONSE CONTROL OF TALL BUILDINGS WITH SINGLE TUNED MASS DAMPER

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ABSTRACT

Wind response control of tall buildings installed with a tuned mass damper (TMD) is investigated. The performance of a TMD installed at the topmost floor of a 76-storey benchmark building is compared with the TMD installed at different floors (locations) of the building. The TMD is placed where particular mode shape amplitude of the building is largest or larger. At each location, the performance of the TMD is examined by tuning it to the first few modal frequencies. The coupled differential equations of motion for the building without/with the TMD are derived and solved by employing Newmark's integration method. Variations in the normalized response of the controlled building under wind forces are computed to study the effectiveness of using different TMD schemes. Placement, tuning frequencies, mass and damping ratios of the devices are the parameters investigated to compare the effectiveness of these different TMD schemes. It is concluded that placement of the TMD shows a significant influence in improvement of the performance of the TMD, especially if it is tuned to the corresponding modal frequency. In addition, the optimally determined damping ratio reduces for the TMD tuned to the higher modal frequencies.

Keywords: modal frequency/ shape; tuned mass damper (TMD); tall building; wind forces.

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