World Academy of Science, Engineering and Technology
International Journal of Mechanical and Industrial Engineering
Vol:17, No:04, 2023

# Optimization and Vibration Suppression of Double Tuned Inertial Mass Damper of Damped System

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**Abstract :** Inerter is a two-terminal inertial element that can produce apparent mass far larger than its physical mass. A double tuned inertial mass damper (DTIMD) is developed by combining a spring with an inerter and a dashpot in series to replace the viscous damper of a tuned mass damper (TMD), and its performance is investigated. Firstly, the DTIMD is optimized numerically with H∞ and H2 methods considering the system's damping based on the single-degree-of-freedom (SDOF)-DTIMD system, and the optimal structural parameters are obtained. Then, compared with a TMD, the control effect of the DTIMD with the optimal structural parameters on wind-induced vibration of a wind turbine in downwind direction under the shutdown condition is studied. The results demonstrate that the vibration suppression of the DTIMD is superior than that of a TMD at the same mass ratio. And at the identical vibration suppression, the tuned mass of the DTIMD can be reduced by up to 40% compared with a TMD.

**Keywords :** wind-induced vibration, vibration control, inerter, tuned mass damper, damped system
**Conference Title :** ICCWE 2023 : International Conference on Computational Wind Engineering
**Conference Location :** New York, United States
**Conference Dates :** April 24-25, 2023