

## Optimal design of Tuned Mass Damper Inerter for base isolated structures

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*Abstract:* In this study the use of the Tuned Mass Damper Inerter (TMDI) to control the response of base isolated structures under stochastic horizontal base acceleration is examined. The TMDI, recently introduced as a generalization of the classical Tuned Mass Damper, allows to achieve enhanced performance compared to the other passive vibration control devices. Thus, it represents an ideal alternative for reducing displacements of base isolated structures. To this aim, a straightforward numerical approach is proposed for the optimal design of this device considering a white noise base excitation. Further, optimal TMDI parameters are derived in closed-form minimizing the displacement variance of the corresponding undamped base isolated system. A thorough numerical analysis is performed and related results, in terms of optimal parameters and control performance, are compared with pertinent data obtained by a more computationally demanding iterative optimization procedure. Results pertaining to both white noise and colored noise base excitations, as well as real recorded ground motions, assess the efficiency of the TMDI and the accuracy of the proposed optimal design procedure.

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