

Vibration control of Bridge Super structure using Tuned Mass Damper (TMD)

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Abstract : In this article, vibration caused by earthquake excitation, wind load and the high-speed vehicle in the superstructure has been studied. An attempt has been made to control these vibrations using passive Tuned Mass Dampers (TMD). Tuned mass damper consists of a mass, spring, and viscous damper which dissipates the vibration energy of the primary structure at the damper of the TMD. In the present paper, the concrete box girder bridge superstructure is considered and is modeled using MIDAS software. The bridge is modeled as Euler-Bernoulli beam to study the responses imposed by high-speed vehicle, earthquake excitation and wind load. In the present study, comparative study for the responses has been done considering different velocities of the train. The results obtained in this study are based on Indian standard loadings specified in Indian Railways Board (Bridge Rules). A comparative study has been done for the responses of the high-speed vehicle with and without Tuned Mass Dampers. The results indicate that there is a significant reduction in displacement and acceleration in the bridge superstructure when Tuned Mass Damper is used.

Keywords : bridge superstructure, high speed vehicle, tuned mass damper, TMD, vibration control

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