

Lecture in CSM:

Novel Design Approach of a Nonlinear Tuned Mass Damper with Duffing Stiffness

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ABSTRACT

In practical engineering, a tuned mass damper (TMD) inherently exhibits nonlinear behavior owing to its large displacement or the application of a limiting stopper. Therefore, the nonlinear behavior of TMD needs to be considered in the design process. In this lecture, the control performance of a TMD caused by nonlinear spring stiffness is taken into account for practical application.

A new analysis and design method of a nonlinear TMD is proposed. Based on the analysis of the nonlinear TMD, a modified design of a nonlinear TMD is presented according to the jump frequency. The analytic solutions of the jump frequency that can be used to design the nonlinear TMD are obtained. The results of the simulation and experiment prove that the proposed design method considering the nonlinear behavior of the TMD will improve the control performance of the nonlinear TMD compared to the linear-based design method.