



# Multi-Tuned Mass Dampers for Seismic Response Reduction of Mid and High-Rise Buildings

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## Abstract

The purpose of this study is to investigate the effectiveness of multi-tuned mass dampers on reduction of acceleration and RMS acceleration of mid and high-rise buildings. Two 16 and 32 story buildings are designed according to Iranian code. The buildings are analyzed under the time history records of Bam and Zaraned earthquakes. Two TMDs are specified for the structures. The first TMD is placed on the top and the other is located somewhere at the middle stories. Numerical results show that the multi-tuned mass dampers reduce the acceleration of middle stories by 10-15% more than a single TMD. Time history analyses also indicate that the multiple mass dampers weighing 6% to 8% of the total structure weight with uniform distribution on the stories of the structures decrease acceleration. These reduction is about 15-30% for acceleration and RMS acceleration in comparison with those of uncontrolled structure.

**Keywords:** Multi-tuned mass dampers, Time history analyses, acceleration and RMS acceleration reduction

## 1. INTRODUCTION

A tuned mass damper is a passive control device consisting of a lumped mass with a spring and viscous damper attached properly to the main structure to reduce any undesirable vibration of the system. Recently systems with multiple tuned mass dampers have been proposed. In these systems each TMD is tuned to a different natural frequency of the structure, see Figure 1.

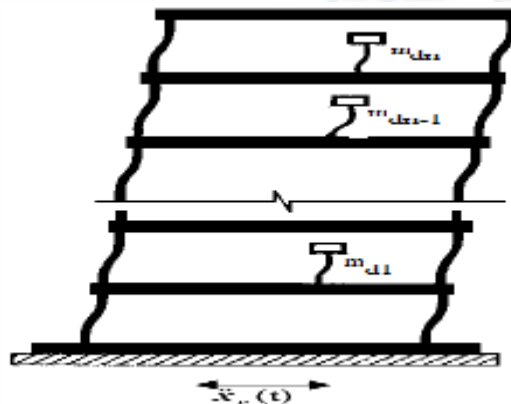


Figure 1. Multiple tuned mass dampers