PARAMETRIC STUDYON OPTIMUM DETERMINATIONOF DOUBLETUNNED MASS DAMPER (DTMD)CHARACTERISTICSFOR MOMENT–RESISTING STEEL FRAMESUNDERSEISMIC LOADING

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ABSTRACT

In this study, in order to reduce undesirable vibrations which is caused by seismic loads in structure a special type oftuned mass damper(TMD) named doubletuned mass damper (DTMD) has been surveyed to find optimal characteristics of thisdamper and it's efficiency in comparosion withtuned mass damper.Doubletuned mass damperconsists of one large and one smaller tuned mass damper for achieving more effective and more capable system to reduce undesirable vibrations resulting from seismic loads. Therefore the damper was located in roof storey of 5 and 10-storey structures with steel frames and about 850time history analyses have been done by considering nonlinear behavior of the structure. The criteria of this study is displacement of storeys and the trial and error method has been used for obtaining the specifications of damper.The result shows that double tuned mass damper is more effective than tuned mass damper in order to reduce the displacement responses of these structures and in additionsome tables has been presented for extracting the optimal characteristics of two types of dampers.

INTRODUCTION

In recent years, energy disipation and reducing responses of the structure against dynamic loads such as wind and earthquake have been interested byresearchers. Passive control method is one of the most common methods for this purpose, as well as useful which some of it's advantages in comparison with other methods are low cost of maintenance and operation and it's capability of permanent exploit. Tuned mass damper is oneof the passive control methods.

The basic ideaof double tuned mass damper has been proposed by Li and Han (2006) which was raised for the first time using several DTMD which simultaneously forms MDTMD that creates a system with more effectiveness and robustnessagainst the seismic loads. Then Li (2006) in other research on the MDTMDnamed DTMD which is composed of a big damper and a smaller damper in terms of simplicity of construction and practical application as a system that requires more research .Li and Zhu (2006) dedicated to research on numerical method for finding the optimal DTMD indicated that it has effective and robust fuctioninorder to reduceundesirablevibrations of structures against seismic loads.

Other important tips iswhen structure enter nonlinear area that so far few studies in this field has been done.in this case the optimum specification of damper that was calculated by considering linear behavior of structure,is not optimum any more in non-linear behavior of the structure and can even increase the responses as well.