Application of viscous dampers for structural response reduction in building renovation

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Abstract

This paper introduces a new idea in the reconstruction and continuation projects. By arranging damping devices, the additional damping of the structure is increased, thereby reducing the dynamic response of the structure under the new seismic precautionary criterion. This paper focuses on the study of viscous dampers which one of the damping device, introduces the energy dissipation principle of viscous dampers, and combines a two-story plane frame case to analyze and compare the dynamic response between non-damping structure and damping structure. The location and quantity of the arrangement were compared with multiple models. Through analysis, it can be seen that by equipping with viscous dampers, seismic energy can be effectively dissipated, thereby reducing the workload of structural reinforcement and having less impact on the original structure. Finally, two commonly analysis methods in damping structures are studied, direct integration method and fast nonlinear analysis (FNA), the main differences between the two analysis methods are introduced, and the calculation results of the two methods are compared and analyzed.

Keywords: reconstruction; viscous damper system; nonlinear time history analysis.

1 Introduction

In recent years, with the rapid development of social economy, the function or shape of buildings needs to be changed. So a large number of reconstruction and continuation projects have emerged. The reconstruction of these buildings often needs to be redesigned under new seismic standards. The original design cannot meet the new requirements. The traditional seismic design method is to increase the structural strength and ductility to meet the performance goal of "no damage under frequent earthquakes and no collapse under rare earthquakes (earthquake intensity with 2% ~ 3% probability of exceeding in 50 years)". For reconstruction and continuation projects, it is often necessary to strengthen and supplement the components that do not meet the requirements. But the disadvantage is that the reinforcement project has a long period and a large construction scope, and it will cause damage to the original structure [1]. At the same time, the rapid development of seismic mitigation technology provides a new way for the

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