



Comparing three Rehabilitation Techniques in Upgrading the Seismic Performance of a 7 Story Building with RC Frames

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Abstract

In this paper comparing 3 rehabilitation techniques for retrofitting a 7 story building. For this porpose considered a 7 story structural model with reinforcement concrete moment resisting frames system that designed by old seismic and concrete regulations. Nonlinear static and dynamic and endurance time method analysis on the model was done. According to the results, the model have not life safety level and need to retrofitting. Have upgraded seismic performance level of the model by 3 methods. The methods are: adding steel brace, adding concrete shear wall and adding concrete peripheral frame to the structure. The retrofitting models evaluated by the new regulations and according to the results, the retrofitting models reach to the life safety performance level and target displacement have decresed.

Keywords: Reinforced concrete, Moment resisting frames, Evaluation of seismic performance, Retrofitting techniques, Nonlinear analysis

1. INTRODUCTION

In recent years have been extensive research on earthquake engineering and regulations and guidelines in this regard have been developed. Over time, errors of regulations have been resolved, and a variety of rehabilitation methods to improvement of seismic regulations have been added. There are many buildings that use the old regulations or errors in calculations have needed to rehabilitation. So engineers in addition to the design and construction of new buildings, a lot of attention to the rehabilitation and repairing damaged buildings and developed easier and more effective rehabilitation methods for doing so are. The earthquake caused severe damage to due to nonelastic behavior of structures, because after elastic range change the resistance was negligible and plastic deformation occurred. In performance base design method, because nonlinear functions of structural components are examined, more correct behavior of the structures have been obtained. In performance base design method two important main performance level and evaluation methods always be considered.

For reinforcement concrete buildings, there are various methods for seismic rehabilitation. Use different and each is capable of using its own cases. Rehabilitation can be performe locally or general on the building members. Select the methods for retrofitting on the reinforcement concrete buildings and its members depends on several factors. Such as these are factors pointed to increase strength, building condition and its members and economic considerations.

The research was conducted in the seismic rehabilitation to be noted, evaluation seismic performance level for reinforcement concrete building with moment resisting frame system [1], retrofitting buildings by adding masonry infill wall and FRP [2], comparing retrofitting by adding concrete shear wall and adding masonry infill wall [3], retrofitting reinforcement concrete building by adding steel brace [4], consideration retrofitting reinforcement concrete frame by adding steel knee braced and steel X braced [5].

In this study used 3 methods for analysis. These methods are: nonlinear static analysis (pushover), nonlinear dynamic time history analysis and endurance time (ET) method analysis. For dynamic time history analysis used 7 accelerograms. Considered average resposes of 7 accelerograms as a final answer. Endurance Time method is basically a simple dynamic pushover test that tries to predict damage measure of structures at different intensity measures by subjecting them to some predesigned intensifying dynamic excitations. Because of the increasing demand of the ET acceleration function, structures gradually go through elastic to yielding and nonlinear inelastic phases, finally leading to global dynamic instability [6,7]. For this analysis have 3 accelerograms that called (e) series ET accelerograms. Considered average resposes of 3 accelerograms as a final answer.