

Seismic Response of Dual Systems Consisted of Steel Moment-Resisting Frames with Shear Wall under Influencing Pulse Type Ground Motion

Hamed Movahed¹, Afshin Meshkat-Dini², Mohsen Tehranizadeh³

¹MSc. Graduated, Earthquake engineering, Amir-Kabir University of Technology, Tehran, Iran
h.movahed60@gmail.com

²PhD. Graduated, Structural engineering, Amir-Kabir University of Technology, Tehran, Iran
a_meshkat@yahoo.com

³Professor of Civil Engineering, Amir-Kabir University of Technology, Tehran, Iran
m.teh.2008@gmail.com

ABSTRACT

The seismic responses of dual systems consisted of steel moment-resisting frames with shear wall (which is used in steel structures as seismic lateral load resistant system) under influencing pulse type ground motion have been evaluated in this paper. This aim is obtained Based on conducting a number of non-linear dynamic time history analyses which were executed on designed structural models by the chosen big ground motions. The designed structural models are consisted four 10- and 20-story frames which are classified in groups of; special moment-resisting frame with side shear wall and special moment-resisting frame with middle shear wall. The selected models were designed for seismic lateral load by the Iranian seismic code 2800 (3rd Edition). The non-linear analyses have been conducted according to three different groups of earthquake records which are classified based on the type of velocity pulse or pulses in their time history. According to the analytical results, it is important to consider the effects of the kinematic energy imposed by strong earthquakes on response parameters of shear wall lateral load resistant system of steel structures. Consequently, it should be noted that the velocity parameter of recorded ground motions can be considered as a design criterion for the structures that must be constructed in near fault areas.

Key Words: Non-linear response, Dual system (SMRF plus to shear wall), Near-field, Velocity pulse.

1 INTRODUCTION

In this paper characteristics of the seismic response of dual systems with shear wall which is used in steel structures as earthquake resistant system are presented. The results are discussed based on conducting a number of non-linear dynamic time history analyses which were executed according to some chosen strong earthquake records.

The structural models consist four 10- and 20-story frames in groups of Special Moment-Resisting Frame with side Shear Wall (SMRF+sideSh.W.) and Special Moment-Resisting Frame with middle Shear Wall (SMRF+middleSh.W.). The structural models have been designed for lateral seismic load according to the Iranian seismic code 2800 (3rd Edition) [1]. The sections, joints and members of all structural models have been designed and controlled according to the Iranian national building code; concrete structures (Part 9) [2] and the Iranian national building code; steel structures (Part 10) [3].

To evaluate the aseismic response properties of all structural models, the nonlinear analyses have been conducted according to three different groups of earthquake records which are classified based on the type of velocity pulse or pulses would be appeared in their time history. These three