EFFECT OF FAR FIELD EARTHQUAKES ON COLUMN AXIAL FORCE OF STEEL-BRACED FRAME WITH CONTROLLED DAMAGE

Masoomeh NARAGHI
M.Sc. Student in Civil Engineering, University of Science and Culture, Arak, Iran
masoome.naraghi@gmail.com

Abdolreza S. MOGHADAM
Associate Professor, IIEES, Tehran, Iran
moghadam.research@gmail.com

Keywords: Rocking, Column Axial Force, Replaceable Fuses, Post Tension Tendon, Far Field Earthquake

Resisting conventional systems against earthquake force experience inelastic behavior along large earthquake that resulted in distributing damage and residual drifts, Therefore, repairing these damages are not affordable and sometimes leads to the destruction of structure (Eatherton et al., 2008).

The used system in this article is steel-braced frame with controlled damage that has rocking ability. This system make promoted seismic performance by reducing damages that created by earthquake. This system has parts such as 1. post tensioning tendons that make self centering ability and 2. replaceable fuses for concentrating damage (Hajjar et al., 2010). So, it's expected, with using this system and with acceptable cost, there isn't be any damage and residual drifts, and frame be remained elastic. For examining seismic behavior of this system, one of the response parameters and common criteria is the column axial force that it is studied in both state of the presence and absence of the rocking motion.

The system that is used in this paper is the three floor steel braced frame with controlled damage and rocking ability. It's modeled in OpenSees. Figure 1 shows the frame in this paper.

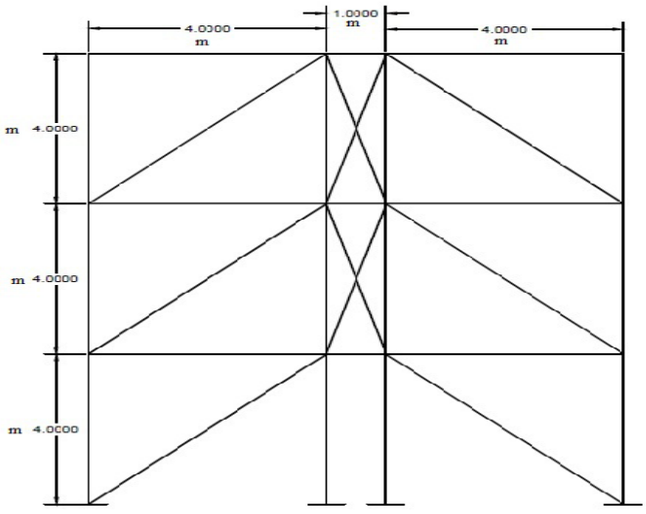

Figure 1. Steel braced frame with controlled damage and rocking ability

In this study, steel braced frame with controlled damage and rocking ability is analyzed under 22 far field earthquake records and three different scale factors. The column axial force is calculated for first floor and the average of maximum axial force in columns for 22 earthquake records at every scale factor is compared with steel braced frames with controlled

damage but without the rocking ability.

In Figure 2, the comparing results of the average values for the maximum axial force in the columns under the 22 far field earthquake records at three scale factors has been shown.

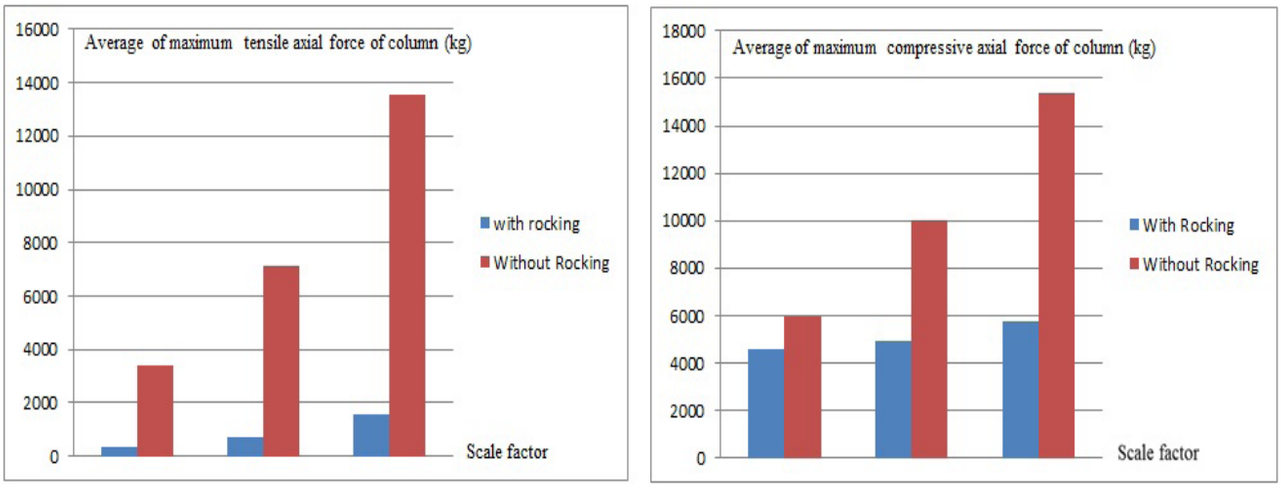

Figure 2. The comparing results of the average value of the maximum axial force in the columns

REFERENCES

Eatherton MR et al. (2008) Controlled Rocking of Steel-framed Buildings With Replaceable Energy-dissipating Fuses, Beijing, China

Hajjar J et al. (2010) Hybrid Simulation Testing of a Controlled Rocking Steel Braced Frame System, Toronto, Ontario, Canada