PERFORMANCE OF STRENGTH VERTICAL IRREGULAR STEEL BUILDINGS IN NEAR- FAULT GROUND MOTIONS

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Seismic Performance of steel buildings with vertical strength irregularity into regular type, can be seriously different from type and degree of irregularity and severity of seismic level. Commonly seismic performance analyses methods codified and expanded for regular structures (Le-Trung et al., 2012).

In other words in near field regions that because of the short distance between active fault and building site, seismic waves don't have sufficient time for damping, the effective time for near field earthquake records are usually less and the range of velocity and displacement are more than far fields one (Alavi and Krawinkler, 2000). This causes the energy of earthquake entirely affect on structure at a few cycles. This type of loading increases the displacement requirements, damages and inelastic behavior rather than far field earthquake records one (Pirizadeh and Shakib, 2013). With respect to the inelastic behavior of structures situated in near field regions and type of stiffness and strength distribution in elevation of structure affects on this inelastic behavior, in this study the structure models with vertical strength irregularity with steel special moment frame resisting system under near field earthquake records characteristics designed with linear static and dynamic analysis According to "Minimum Design Loads for Buildings and Other Structures (ASCE/SEI 7-10 Standard)" published by American Society of Civil Engineers in 2010. Then the models evaluated and controlled with nonlinear response spectrum dynamic analysis for far and near field earthquake records inclusive and without the vertical component effect and according to "Seismic Rehabilitation of Existing Buildings (ASCE/SEI 41-06 Standard)" published by American Society of Civil Engineers in 2007.

Seismic performance of vertical irregular buildings were compared with regular types, from average of seven earthquake records with Seismic Rehabilitation of Existing Buildings characteristics, for example The most important curves for max drift in x direction at fourth story strength irregularity (SR h4=0.67, SR h4=0.63) model for all story and for three type of records analysis (far field, near field with tow component [2D], near field with three component [3D]) are shown in Figure 1. Also their comparison between first and fourth story are shown in Figure 2.

Based on the present it can be shown that for Soft Story and Weak Story Irregularity, the design code characteristics require more research that respective results for increasing safety in studied model buildings are shown.

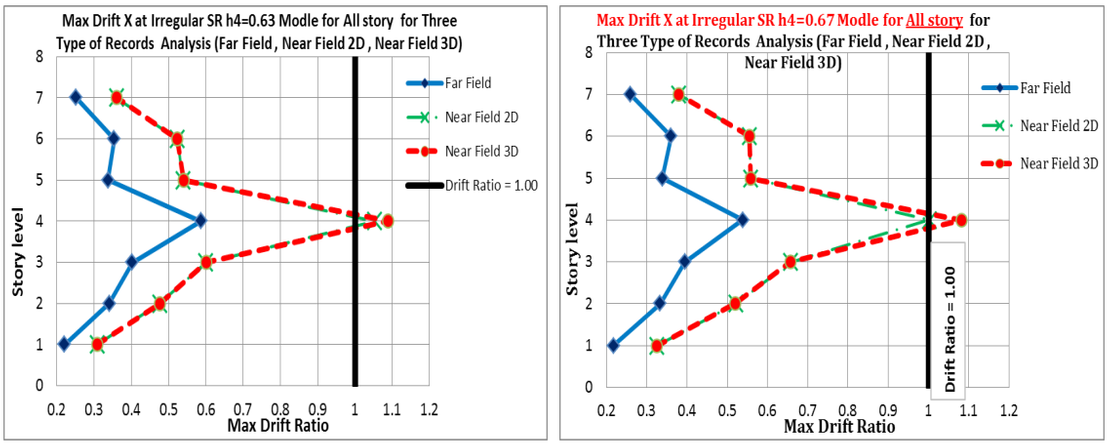

Figure 1. Max Drift in X direction at Irregular SR h4=0.67, 0.63 Modle for All story for Three Type of Records Analysis (Far Field, Near Field 2D, Near Field 3D)

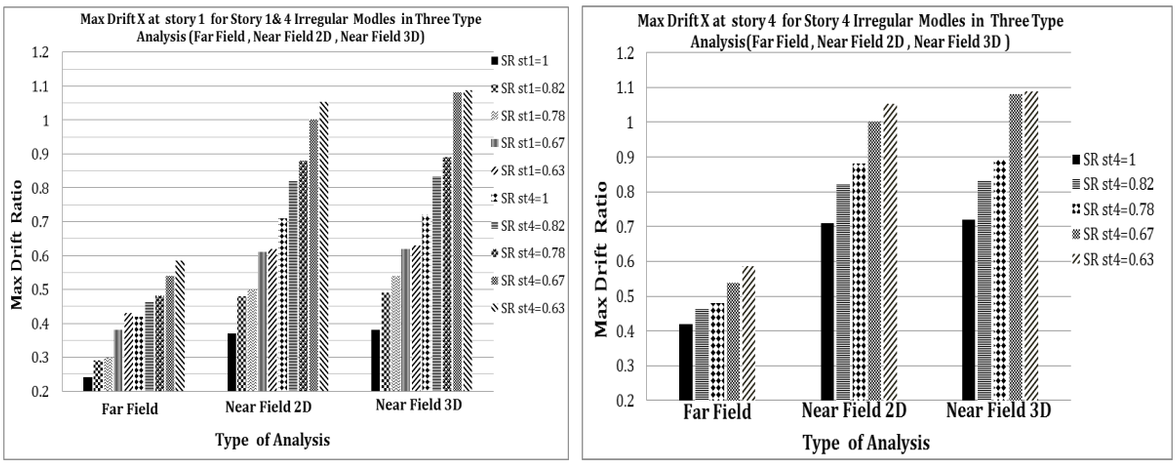

Figure 2. Max Drift X at story 1 for Story 1& 4 Irregular Models in Three Type Analysis (Far Field, Near Field 2D, Near Field 3D)

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