EFFECT OF RESIDUAL STRENGTH ON THE BEHAVIOUR OF ENERGY DISSIPATING AT STEEL-BRACED FRAME WITH LOW DAMAGE SYSTEM

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Research and experience of past earthquakes suggest the need for buildings which are less vulnerable to damage and easier to repair after a major earthquake. In a major earthquake, traditional seismic lateral resisting systems can impose serious damages in structural system and residual drifts are so large and non affordable to repair.Therefore, applying types of structural systems which is known as low damage systems is promoted. (Eatherton et al., 2010). These systems include rocking able frame, replaceable fuses and vertical post tensioning tendons to return structure to its initial state. (Hall et al., 2010).

Different parameters such as the effect of residual strength parameter on fuse performance is evaluated and then, the behaviour of steel-braced frame is examined.

The frame of this study modeled in OpenSees (Figure 1). This model includes two steel braced frames linked by replaceable energy dissipating fuses that are engaged by controlled rocking behavior. The frames are post-tensioned vertically to the foundation so as to facilitate self-centering after rocking.

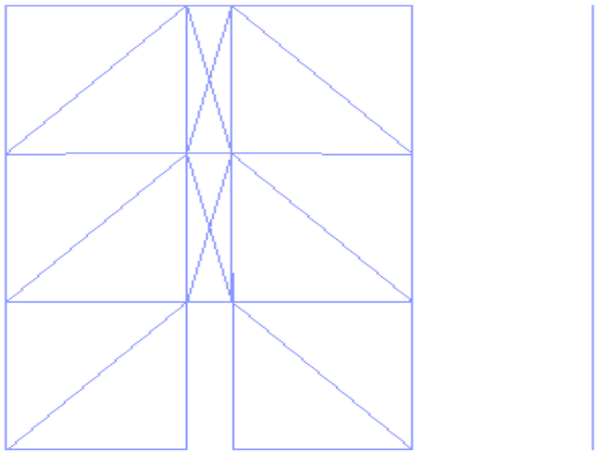

Figure 1. Steel-braced frame with low damage system at OpenSees

The residual strength parameter is the ratio of residual strength to yield strength. For examining the effect of this parameter, the outputs such as tension axial force and compressive axial force for columns of first floor, drifts, uplifts, vertical and horizontal floors accelerations, have been used. The frame is analysed for the time which the parameter is equal

to 0.25, 0.5 and 1.The results are normalized with the outputs of residual strength which is equal to 0.5.

Some main results, according to the Figure 2, are: 1.The analysed frame with residual strength amount equal to 0.25, has extremely affected on the behaviour of fuse and frame, 2.Under such circumstance that this parameter is equal to 0.25, vertical and horizontal floors accelerations increase about 3.5 times.

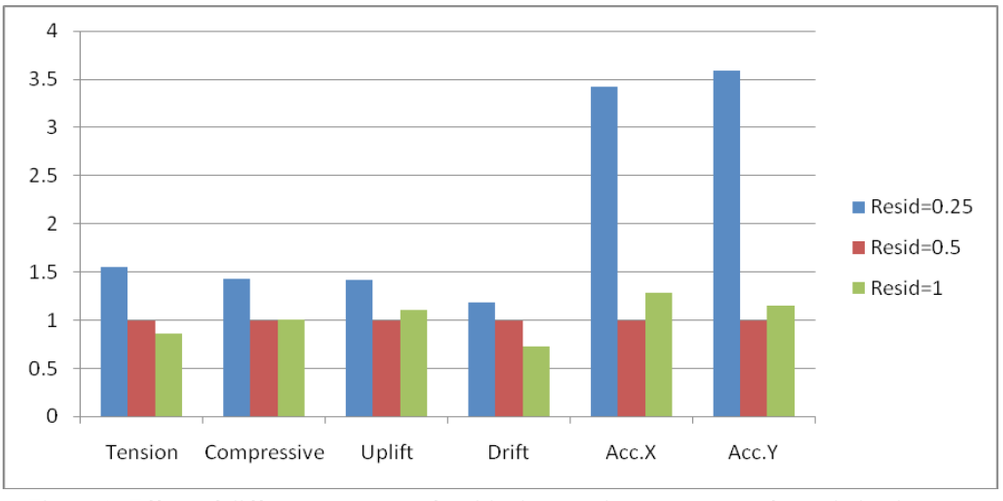

Figure 2. Effect of different amounts of residual strength parameter on frame behaviour

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