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EVALUATION OF SEISMIC BEHAVIOR OF STEEL FRAMES EQUIPPED WITH OFF CENTER BRACING AND EBF BRACING UNDER THE NEAR AND FAR FIELD EARTHQUAKES

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In order to solve the problem of low stiffness in the framing system, as well as the problem of low formability in a frame with a coaxial bracing, Popov proposed a non-axial brace.
There is a great deal of research on earthquake resistant structures today. The earthquake resistance of the structure can be improved by adding dampers to the structure. Therefore, one of the ways to reduce relative displacement and acceleration of floors is to use energy dissipation systems because they absorb and depreciate part of the earthquake input energy alone. Control methods are divided into three main categories of passive, active and semi-active control based on the need for input energy.

In this study, an Evaluation of seismic behavior of steel frames equipped with OFF Center Bracing and EBF bracing under the Near and Far field earthquakes has been investigated. For this purpose, the analysis of nonlinear time histories has been performed under seven seismic records of the near and far field in ABAQUS software on 4, 8 and 12st frames equipped with OFF center and EBF bracing, shown in Figure 1.

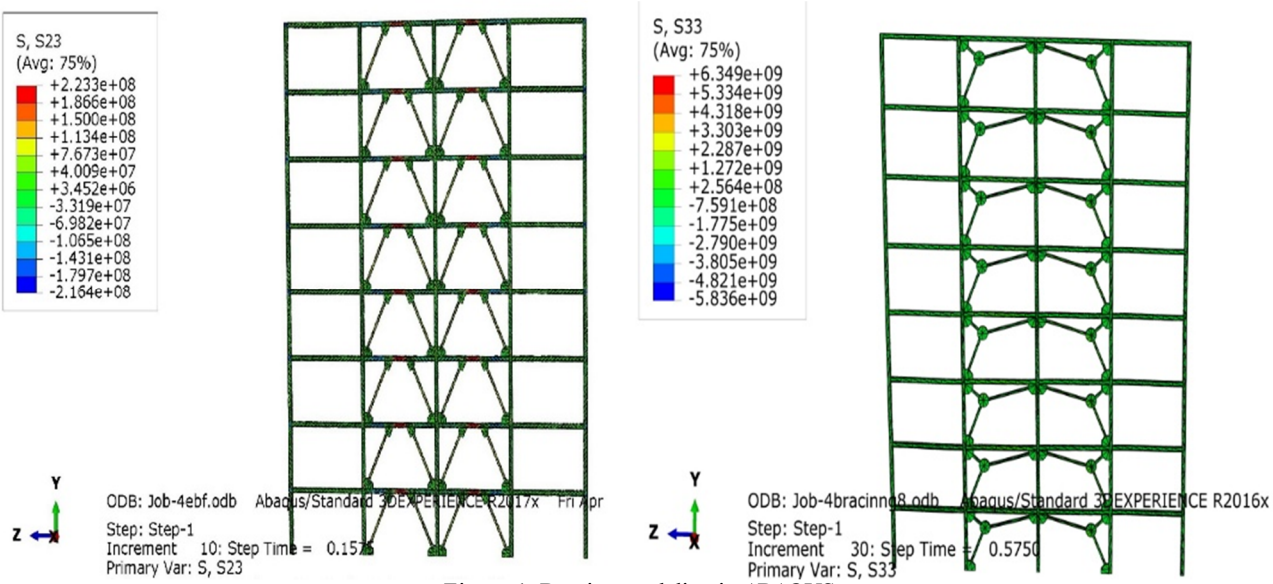

Figure 1. Bracing modeling in ABAQUS.

The far field seismic records are based on the 2800 regulations and the near field seismic records according to the ASCE 4113 instruction and after applying fault angle based on 1.5AB spectrum. The results of nonlinear analysis in ABAQUS software indicate a significant reduction in the location and tension in frames equipped with OFF Center y-shape braces compared to frames with EBF braces. Also, the results of drift and displacements in the 4th and 12th floor frames indicate this near-earthquakes about the extent of damage are more than 20% higher than the far field seismic records in OFF Center y-shape braces, which is heavy vertical component domain in near field earthquakes. Also, the amount of drift of frames equipped OBF braces is less than the frames equipped with EBF bracing. In Figure 2, the maximum relative displacement of the 12-story frame is shown under the near-field records in the frame with a y-shape brace.

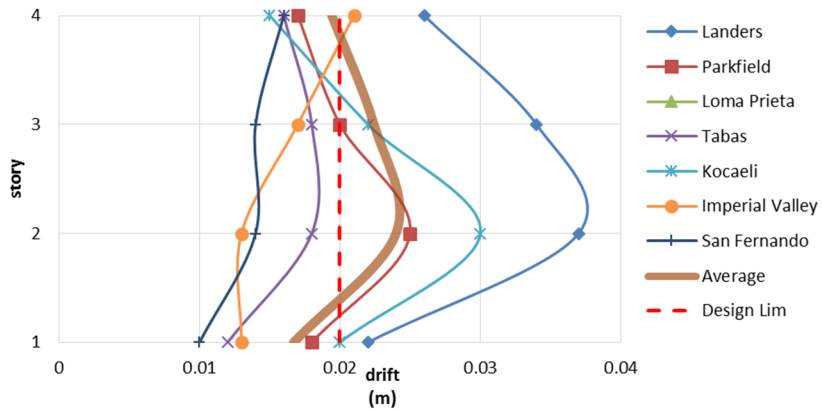

Figure 2. The results of the relative displacement of floors in the 4-story frame under the near-field records with y-shape brace.

In this study, the maximum displacement of the roof, respectively, is subject to near-field disturbances in the frame of the frame with an EBF bracelet and an OFF Center y-shape brace. Comparing earthquakes in the far and near field, it is concluded that the displacement values of roofing under earthquakes in the near field are far greater than the distant domain.

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