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Evaluation of Seismic Behavior of Steel Shear Wall with Opening with Hardener and Beam with Reduced Cross Section under Cycle Loading with Finite Element Analysis Method

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Abstract : During an earthquake, the structure is subjected to seismic loads that cause tension in the members of the building. The use of energy dissipation elements in the structure reduces the percentage of seismic forces on the main members of the building (especially the columns). Steel plate shear wall, as one of the most widely used types of energy dissipation element, has evolved today, and regular drilling of its inner plate is one of the common cases. In the present study, using a finite element method, the shear wall of the steel plate is designed as a floor (with dimensions of 447 × 6/246 cm) with Abacus software and in three different modes on which a cyclic load has been applied. The steel shear wall has a horizontal element (beam) with a reduced beam section (RBS). The hole in the interior plate of the models is created in such a way that it has the process of increasing the area, which makes the effect of increasing the surface area of the hole on the seismic performance of the steel shear wall completely clear. In the end, it was found that with increasing the opening level in the steel shear wall (with reduced cross-section beam), total displacement and plastic strain indicators increased, structural capacity and total energy indicators decreased and the Mises Monson stress index did not change much.

Keywords : steel plate shear wall with opening, cyclic loading, reduced cross-section beam, finite element method, Abaqus software
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