World Academy of Science, Engineering and Technology
International Journal of Civil and Architectural Engineering
Vol:14, No:07, 2020

Assessing the Effect of the Position of the Cavities on the Inner Plate of the Steel Shear Wall under Time History Dynamic Analysis

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Abstract : The seismic forces caused by the waves created in the depths of the earth during the earthquake hit the structure and cause the building to vibrate. Creating large seismic forces will cause low-strength sections in the structure to suffer extensive surface damage. The use of new steel shear walls in steel structures has caused the strength of the building and its main members (columns) to increase due to the reduction and depreciation of seismic forces during earthquakes. In the present study, an attempt was made to evaluate a type of steel shear wall that has regular holes in the inner sheet by modeling the finite element model with Abacus software. The shear wall of the steel plate, measuring 6000 × 3000 mm (one floor) and 3 mm thickness, was modeled with four different pores with a cross-sectional area. The shear wall was dynamically subjected to a time history of 5 seconds by three accelerators, El Centro, Imperial Valley and Kobe. The results showed that increasing the distance between the geometric center of the hole and the geometric center of the inner plate in the steel shear wall (increasing the R_{CS} index) caused the total maximum acceleration to be transferred from the perimeter of the hole to horizontal and vertical beams. The results also show that there is no direct relationship between R_{CS} index and total acceleration in steel shear wall and R_{CS} index is separate from the peak ground acceleration value of earthquake.

Keywords : hollow steel plate shear wall, time history analysis, finite element method, abaqus software
Conference Title : ICCEIM 2020 : International Conference on Civil Engineering Informatics and Modeling
Conference Location : Dublin, Ireland
Conference Dates : July 30-31, 2020