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Limited Component Evaluation of the Effect of Regular Cavities on the Sheet Metal Element of the Steel Plate Shear Wall

Authors : Seyyed Abbas Mojtabavi, Mojtaba Fatzaneh Moghadam, Masoud Mahdavi

Abstract : Steel Metal Shear Wall is one of the most common and widely used energy dissipation systems in structures, which is used today as a damping system due to the increase in the construction of metal structures. In the present study, the shear wall of the steel plate with dimensions of 5×3 m and thickness of 0.024 m was modeled with 2 floors of total height from the base level with finite element method in Abaqus software. The loading is done as a concentrated load at the upper point of the shear wall on the second floor based on step type buckle. The mesh in the model is applied in two directions of length and width of the shear wall, equal to 0.02 and 0.033, respectively, and the mesh in the models is of sweep type. Finally, it was found that the steel plate shear wall with cavity (CSPSW) compared to the SPSW model, S (Mises), Smax (In-Plane Principal), Smax (In-Plane Principal-ABS), Smax (Min Principal) increased by 53%, 70%, 68% and 43%, respectively. The presence of cavities has led to an increase in the estimated stresses, but their presence has caused critical stresses and critical deformations created to be removed from the inner surface of the shear wall and transferred to the desired sections (regular cavities) which can be suggested as a solution in seismic design and improvement of the structure to transfer possible damage during the earthquake and storm to the desired and pre-designed location in the structure.

Keywords : steel plate shear wall, abacus software, finite element method,, boundary element, seismic structural improvement, von misses stress
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