DETERMINATION OF PERFORATED INFILL PLATE ON STEEL PLATE SHEAR WALL`S BEHAVIOR

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Keywords: SPSW, Perforated, Infill Plate, Hysteresis Loops, ABAQUS

SPSW's is one of the best lateral load resist system that has attracted many designers attention because of its various advantages. Thin thickness of infill plate is a result of considerable stiffness of the SPSW system, which causes fabrication difficulties. A practical solution is to use thicker plates and reduce the stiffness by perforating the infill plate. Hence in this research three FE models of an experimental prototype have been investigated (Astaneh-Asl, 2001) as follows:
Experimental Model: One bay single story experimental specimen were designed by the researchers at UB was selected. The frames measured 4000mm wide and 2000mm high between member centerlines and consisted of 345MPa steel members. The infill panels were 2.6mm thick, LYS steel plates with an initial yield stress of 165MPa, and ultimate strength of 300MPa (Bruneau and Vian, 2006).

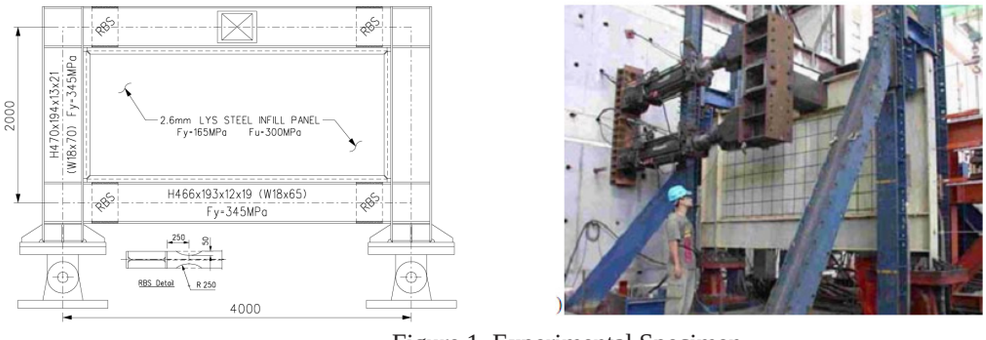
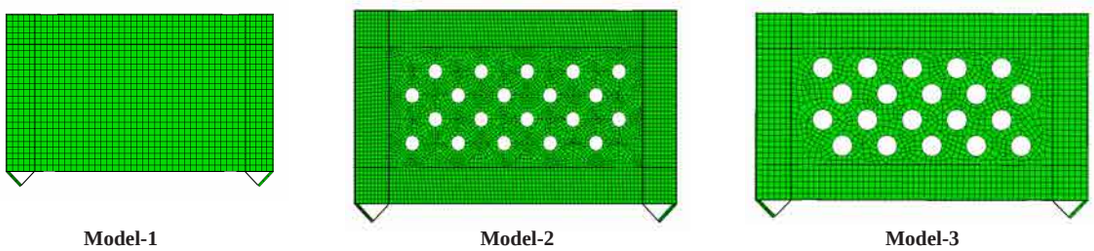


Figure 1. Experimental Specimen

Finite Element Model: The ABAQUS finite element software is utilized for modeling SPSW. Infill plate and boundary frame meshed and modeled by the four-node reduced integrated shell element S4R. FE model verify by comprising Experimental and Numerical Results.Three SPSW was Modelled in ABAQUS software with the thickness of infill plates were consider 1mm in Model-1 and 2mm in Model-2 & 3 respectively. Infill plate in model-2 & 3 was perforated according to equations purposed by AISC341-10.



Model-1 **Model-2** **Model-3**

Figure 2. Finite Element Models

In order to compare behavior of 3 models, hysteresis loops of 3 models are shown in Figure 3. In order to investigate the stiffness, yield strength, ultimate strength, ductility and energy absorption of finite elements models, the push curve of hysteresis loops was drawn and ideal bilinear curve of load-displacement diagram was drawn. Based on this, behavioral parameters of SPSW`s were computed according to Table 1.

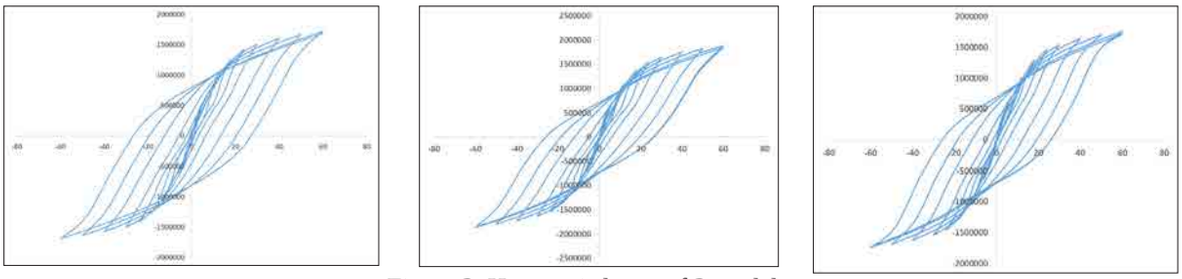


Figure 3. Hysteresis loops of 3 models

Table 1. Behavioral parameters of SPSW`s

MODEL	K	F_u	μ
1	278.6	2380	8.6
2	211.3	2100	7.5
3	200	1810	7.5

The results show that the stiffness of Model-2 & 3 reduces 25% and 30% respectively so it can be recommended that plates with 1.5mm thickness with 30% perforation can be used instead of plate with 1mm web plate thickness.

REFERENCES

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