COMPARISON OF THE BEHAVIOR OF THE MASONRY INFILLED FRAMES SUBJECTED TO DISTRIBUTED AND CONCENTRATED LOADING

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In the most experimental research studies on the infill panels such as Mehrabi et al. (1996), Moghaddam (2004), Mohammadi et al. (2011), a concentrated loading is applied to the frame at the top beam to column connection. In this case, it is assumed that such loading resembles earthquake lateral loading; however, in practical cases, because of the top beam being embedded in the floor slab, the lateral load, caused by earthquake, is distributed over the entire length of the beam. In fact, it can be said that the former is far from what occurs in real cases than the latter.

In this paper, the influence of loading types on the behavior of masonry infilled steel frames is studied. For this purpose, the behavior of the frame subjected to distributed and concentrated loading has been studied through analytical models. The analytical model that the distributed lateral loading is induced throughout the beam is verified by experimental model done by Motovali Emami and Mohammadi (2014). The loading is applied to the specimen in such a way that can be assumed as uniform over the entire length of the top beam (Figure 1). Figure 2 shows the comparison between experimental and analytical model. As it is shown, there is a good agreement between experimental and analytical model in case of distributed lateral loading.

It is shown that overall behavior of the infill frames under distributed and concentrated lateral loading are the same (Figure 2). But the internal stresses that occur in the infill walls are different. Figure 3 shows the compression stress distribution of infill wall in two specimens at drift of 8.5%. It can be said that in the model that concentrated lateral load was applied, the stress distribution causes corner crushing mode in the infill, but the failure mode in the other model is different.

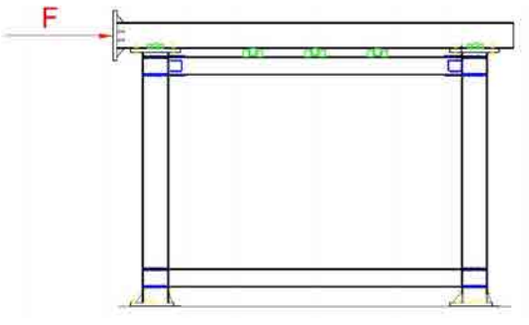


Figure 1. Schematic figure of distributed loading of the specimen (Motovali Emami & Mohammadi, 2014)

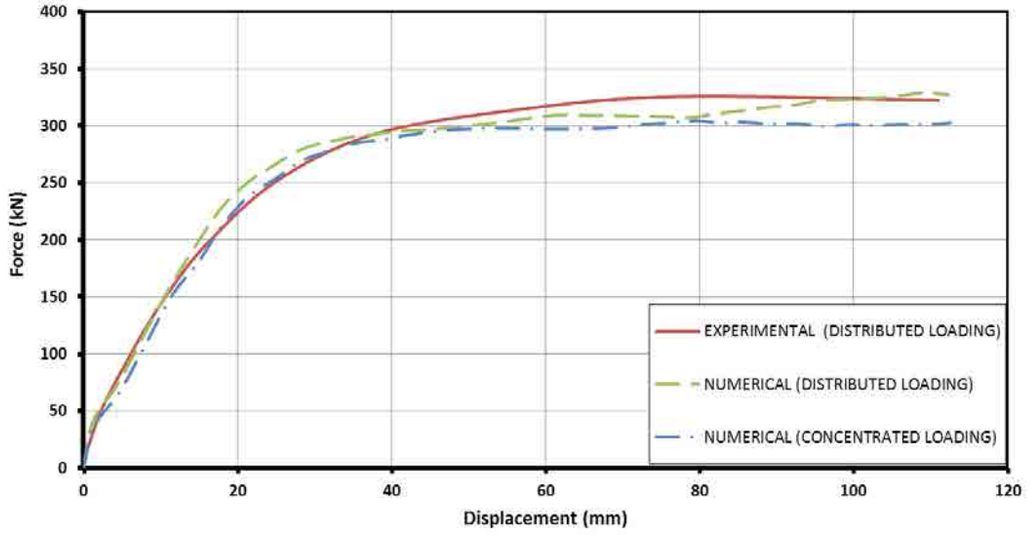
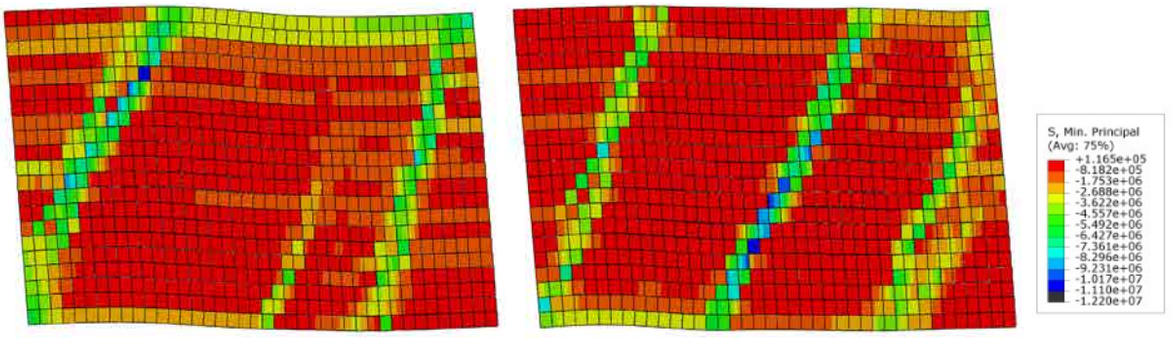


Figure 2. Experimental and analytical capacity curves



a. concentrated loading b. distributed loading

Figure 3. Compression stress distribution for concentrated and distributed loading

REFERENCES

Mehrabi A, Benson Shing P, Schuller M and Noland J (1996) Experimental Evaluation of Masonry-Infilled RC Frames, *J. Struct. Eng.*, 122(3): 228–237

Moghaddam H (2004) Lateral Load Behavior of Masonry Infilled Steel Frames with Repair and Retrofit, *J. Struct. Eng.*, 130(1): 56–63

Mohammadi M, Akrami V and Mohammadi-Ghazi R (2011) Methods to Improve Infilled Frame Ductility, *J. Struct. Eng.*, 137(6): 646–653

Motovali Emami SM and Mohammadi M (2014) Effect of lateral load, number of bays and connection rigidity of the frame on the seismic behavior of infilled frames, PhD Proposal, IIEES