# AN ABSTRACT OF A THESIS

# BEHAVIOR OF MASONRY INFILLED FRAMES SUBJECTED TO OUT-OF-PLANE PRESSURE LOADS

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Steel or reinforced concrete frames infilled with masonry units are common in structures world wide. Infilled frames are relatively simple to construct, can be economical, and provide a strong resistance to lateral loads. Masonry infilled frames have shown, experimentally, to perform well under out-of-plane (OOP) loads. However, due to an incomplete understanding of their behavior, building codes do not currently permit the use of infills as part of the lateral force resisting system in structures.

The research described herein is intended to aid in a better understanding of the OOP behavior of infilled frames by: (1) producing a finite element analysis (FEA) model that accurately replicates experimentally observed behavior and (2) performing a piecewise linear finite element analysis to determine the stress propagation and subsequent cracking in a wall panel that is subjected to an increasing distributed pressure load.

These objectives were accomplished in several steps that included developing preliminary FEA models, developing the final FEA model that was used in the piecewise linear analysis, and comparing the data obtained through the piecewise linear analysis to data obtained from a large-scale in-situ experiment that was preformed on a masonry infilled frame at the Department of Energy's Oak Ridge Y-12 Plant.

The general overall behavior of the wall panel through several horizontal crack steps is presented. The locations of these cracks appeared to correlate with the horizontal cracks that developed in the wall panel of the full-scale experiment. The OOP displacement of the wall panel at successive load steps in the piecewise linear model also correlated well with the OOP displacement of the full-scale test panel at a similar load.