Public Abstract

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Title: Blast Retrofit of CMU wall using Polymer Sheets

Many materials have been tested for blast retrofit design but have shown to have limitation. The focus of this research is the analysis of polymer sheets as a method for retrofit design. There are many advantages of polymer sheets, such as the sheets are very thin and take up very little space, polymer have large amount of energy absorption capabilities, and the installation process is quick and easy to perform in the field.

This research is done to ascertain the strength, ductility, response to static pressure, investigate connection details, and develop an analytical model of the static resistance function. The polymer retrofit system is modeled dynamically in a single-degree of freedom (SDOF) model. The analytical model developed for the static resistance is used in the SDOF model. Additionally, three types of test were conducted at the coupon, connection, and component levels to verify the analytical model. Once the analytical model is verified, it is incorporated into the SDOF model. Additionally, field testing was conducted on three polymers and results were compared to the predicted results. This thesis presents the analytical modeling and experimental evaluation of CMU-polymer walls to blast loading.

The research found that the static resistance function predicted the response of the polymer sheet quite well. The static resistance function was then implemented into the SDOF model which predicts the response of the CMU wall-polymer retrofit system. Live testing data was then used to compare with the SDOF model and it was seen that the model predicted the response very well.