



EXPERIMENTAL STUDY OF THE BEHAVIOR OF PP-BAND MESH RETROFITTED MASONRY HOUSES USING MINIATURE MODELS

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ABSTRACT: Adobe/masonry houses are the most seismic vulnerable structures. It is indispensable to retrofit them economically and efficiently to prevent future human casualties. PP-band mesh retrofitting has been proposed for this purpose. In this paper, the seismic behavior of PP-band mesh retrofitted houses is investigated with miniature models made with acryl blocks as masonry units and lime mortar as paste. The main advantage of this approach is that it is possible to reuse the blocks and carry out many tests without significant additional investment for each test. In this way, various conditions can be readily evaluated [1]. Although not discussed in this paper, this type of tests can also be used as in-situ demonstrations to increase the public's awareness of the vulnerability of adobe/masonry structures and the urgency to retrofit them.

Key Words: PP-band, unreinforced masonry, adobe, shaking table test, miniature model

INTRODUCTION

Past earthquakes have shown that the collapse of seismically weak adobe/masonry structures is responsible for most of the fatalities in developing countries. It is, thus, urgent to improve their seismic performance in order to reduce future fatalities and to protect the existing housing stock. To encourage seismic retrofitting, inexpensive and easy to implement technical solutions are desirable. Retrofitting by polypropylene band (PP-band) meshes satisfies these requirements. These bands commonly used for packing are resistant, inexpensive, durable and worldwide available.

In order to assess the seismic performance of retrofitted structures, full scale shaking table tests are very useful. However, these are expensive and resource consuming thus limiting the number of tests that can be carried out. On the other hand, small-scale models are more accessible requiring smaller testing facilities as well as smaller specimens. This type of tests can be even more cost efficient if the materials used to build the model are reusable.

Considering the above-mentioned situation for the testing of adobe/masonry houses, the use of acryl blocks for adobe brick units and lime mortar for paste is proposed. With these materials several 1:12 small scale specimens with two types of architectural configurations were tested to assess the seismic performance of retrofitted structures. It was verified that under certain conditions it is possible to replicate the seismic behavior of non-retrofitted and retrofitted adobe/masonry structures with these materials in spite of their differences with the materials found at the site. Furthermore, failure mechanisms were clarified and meaningful comparisons between non-retrofitted and retrofitted houses

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