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EXPERIMENTAL STUDY OF PP-BAND RETROFITTED MASONRY WALLETTES

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ABSTRACT: Unreinforced masonry is one of the most used construction materials in the world. It is also unfortunately, the most vulnerable during earthquakes. This combined with the widespread use of masonry in earthquake prone regions of the world has resulted in a large number of casualties due to the collapse of this type of structures. Several methods have been proposed to improve strength, ductility and energy dissipation capability of masonry structures. However, in developing countries, retrofitting masonry structures should be economic, the retrofitting material accessible and local available workmanship used. Also simple construction procedure is needed. Considering these points, a new retrofitting technique has been proposed based on the use of polypropylene bands (PP-bands), which are commonly utilized for packing. This material is available at a very low price even in remote areas of the world. To evaluate the beneficial effects of the proposed PP-band mesh retrofitting method, diagonal shear tests and out-of-plane tests were carried out on masonry wallettes with and without retrofitting. In diagonal shear tests, the masonry wallettes were retrofitted with meshes whose borders were connected with either epoxy or just by overlapping to evaluate whether the connection type influences the retrofitting performance. From both tests results, which are highlighted in the paper, it could be seen that PP-band retrofitted masonry wallettes had larger residual strength after the first crack in both in-plane and out-of-plane loading. It was clear that PP-band mesh retrofitting improved the overall stability and ductility of the structure.

Key Words: unreinforced masonry, polypropylene band, diagonal shear test, residual strength, wire connectors, wallettes

INTRODUCTION

In order to verify the suitability of the proposed retrofitting technique, an experimental program was designed and executed. A real scale model test makes possible to obtain data similar to real structures. However, it requires large size testing facilities and large amount research funds, so it is difficult to execute parametric tests by using full scaled models. Recently, structural tests of scaled models become well-known as the overall behavior of the system can be also understood from scaled model. In this experimental program ¼ scale model was used to investigate the static and seismic behavior of masonry walls.

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