COMPARISON OF THE SEISMIC PERFORMANCE OF DIFFERENT STRENGTH MASONRY STRUCTURES RETROFITTED WITH PP-BAND MESHES

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ABSTRACT

Retrofitting of low earthquake-resistant masonry structures is the key issue for earthquake disaster mitigation in developing countries because it is the only way to significantly reduce casualties in future events. To promote structural retrofitting it is indispensable to equally consider technical feasibility, economical affordability, and social acceptability of the proposed retrofitting method. Furthermore, because self-construction is a widespread practice in these countries, the retrofitting procedure should also be simple to implement.

Polypropylene bands (PP-bands), which are conventionally used for packing, are inexpensive, strong, light, and durable. Meshes made of these bands have been proposed as suitable retrofitting material for masonry houses. The suitability of this procedure has been verified experimentally through static tests. In this paper, the results of 1/4 small scale shaking table tests are presented. Four 1-story masonry models, two retrofitted and the other not, were subjected to sinusoidal base input motions. The tests showed that PP-band meshes dramatically improved the seismic structural capacity. The retrofitted specimen withstood base motions with peak ground displacements and peak ground velocities, several times higher than those of the motion that caused the non-retrofitted structure total collapse. These dynamic tests further corroborated the efficiency of PP-band mesh retrofitting.

1. INTRODUCTION

Metropolises in seismic prone regions face the problem of large number of existing vulnerable buildings especially unreinforced masonry dwellings. Historical and recent earthquakes (Gujurat 2001, Bam 2003, Kashmir 2005, and Java 2006) have demonstrated that the collapse of this type of structures causes most of the fatalities during these events (Coburn and Spence, 2002).