



EXPERIMENTAL STUDY OF IN-PLANE AND OUT-OF-PLANE BEHAVIOR OF PP-BAND RETROFITTED MASONRY WALLETTTE MADE OF SHAPELESS STONES

Kotaro SAKURAI¹, Navaratnarajah SATHIPARAN² and Kimiro MEGURO³

ABSTRACT: Unreinforced masonry structure is one of the most popularly used constructions in the world, especially in developing countries. It is also unfortunately, the most vulnerable to the earthquake. In this research, we conducted a series of experiments to verify the suitability of PP-band retrofitting for masonry structures made of shapeless stones. Material tests were conducted to understand the basic parameters of stone masonry, i.e. shear, tension and compression strength. After the material tests, diagonal compression test and out-of-plane test were carried out using masonry walleTTte made of shapeless stones with and without retrofitting. From both test results, it was clear that PP-band retrofitting improved drastically the overall stability and ductility of stone masonry structures made of shapeless stones

Key Words: Stone Masonry, PP-band Retrofitting, Diagonal Compression Test, Out-of-Plane Test

INTRODUCTION

Masonry structure, constructed by piling burned bricks, just sun-dried unburned bricks called adobes, stones or concrete blocks, is one of the most popularly used constructions in the world, but also the most vulnerable to earthquakes. Because distribution of the masonry structures overlap with high seismicity area in the world, it has caused many human casualties during earthquake. Therefore in global viewpoint, retrofitting of low earthquake-resistant masonry structures is very important to save people from earthquake disaster. Considering these points, a new retrofitting technique for masonry has been developed based on the use of polypropylene band (PP-band) meshes by Meguro laboratory, The University of Tokyo¹. This PP-band retrofitting technique prevents masonry structures from collapsing by giving the stabilization.

Up to now PP-band retrofitting study mainly focus on houses build by regularly shaped bricks and adobes. But the masonry has many different kinds of construction and the effect of PP-band is not confirmed for all kinds of masonry. Especially in the mountainous region in developing countries, stone masonry is constructed using shapeless or shaped stones as constructing material². But stone masonry house, particularly shapeless stone masonry house is the most vulnerable during earthquake as shown in Table 1. Therefore further test of stone masonry walleTTtes should be carried out.

¹ Graduate Student, Department of Civil Engineering, The University of Tokyo.

² JSPS Post Doctoral Fellow, Institute of Industrial Science, The University of Tokyo.

³ Director/Professor, International Center for Urban Safety Engineering, Institute of Industrial Science, The University of Tokyo.