

# Dynamic Behavior of Masonry Houses Retrofitted by Bamboo Band Meshes



**Kimiro Meguro**

*The University of Tokyo, Japan*

**Rajendra SOTI**

*The University of Tokyo, Japan*

**Sathiparan Navaratnaraj**

*The University of Tokyo, Japan*

**Muneyoshi NUMADA**

*The University of Tokyo, Japan*

## SUMMARY

The collapse of unreinforced masonry structures, which are widely distributed around the earthquake prone regions of the world, is one of the greatest causes of death in major earthquake disasters. This paper presents an innovative retrofitting method for masonry structures, which uses bamboo band arranged in a mesh fashion and embedded in a mortar overlay. In order to evaluate the effectiveness of the proposed retrofitting technique, shake table tests were conducted using retrofitted and non-retrofitted 1/4 scaled masonry houses with sinusoidal ground motion inputs. Based on the experimental results, the retrofitted specimen exhibited good seismic performance withstanding over twice larger input energy than what non-retrofitted specimen could do.

*Keywords: unreinforced masonry, bamboo-band mesh, shaking table test, PP-band mesh seismic retrofit*

## 1. INTRODUCTION

The collapse of the unreinforced masonry buildings due to ground motion is one of the greatest causes of the human casualties during earthquake disasters around the world. The failure of unreinforced masonry structures contributes to more than 60 % of the structural damage of masonry structures (Coburn 2002). Around 30 % of the world's population lives in adobe construction (Houben 2001) and large proportion of the structures are located in earthquake prone regions. Thus, strengthening of unreinforced masonry structure is indispensable to reduce the casualties significantly. Till date, several types of retrofitting methods have been developed for unreinforced masonry structures. Retrofitting technique for developing countries should consider not only the effectiveness in terms of seismic performance but also the issues like economic viability, cultural adoptability and material as well as technological availability. Under the aforementioned circumstances, PP-Band Retrofitting Technique is one of the appropriate retrofitting techniques and different aspects of this method have already been studied in Meguro Laboratory, the Institute of Industrial Science (IIS), The University of Tokyo (Sathiparan 2008, Meguro 2009 and Sathiparan 2010). On the other hand, another strengthening technique, which uses bamboo band meshes as a strengthening system, has been proposed and different aspects are being researched in Meguro laboratory. Bamboo-band retrofitting technique is simple enough to be understood and applied by layman without any prior engineering expertise. In the study, shake table tests were carried out to understand the dynamic response of unreinforced masonry buildings and those retrofitted by bamboo-band mesh, crack propagation and failure mechanism of them.