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RESEARCH ARTICLE - CIVIL ENGINEERING

A Comparative Study of Meshtype Retrofitting for Unreinforced Masonry Under In-plane Loading

Navaratnarajah Sathiparan[1] · **N. A. A. C. Nissanka**[1] · **R. L. S. Priyankara**[1]

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Abstract Seismic loads directed toward vulnerable masonry structures may cause considerable damage and loss of life. As a result, there is now a desire to increase the seismic resistance of many types of existing masonry structures. Different conventional retrofitting techniques are available to increase the strength and/or ductility of unreinforced masonry walls. Recent years, several researches work on meshtype retrofitting for masonry structures to delay or prevent the collapse of buildings and reduce the number of lives lost during devastating earthquake events. The meshtype retrofitting can be made of any ductile material, including: steel cage, polymer, polypropylene band and plastic carrier bag. In this campaign, six brick masonry wall panels were tested. This was done by applying static horizontal loads on top, combined with a pre-compression level, to obtain information about the failure mode, displacement capacity and strength capacity.

Keywords Masonry · Earthquake · Seismic retrofitting · Meshes · Residual strength

1 Introduction

Masonry, through its long history, is widespread used around the world and still remains as a main building material in many places especially in developing countries. More than 60 % of people in the world are living in masonry buildings that are made by piling up bricks, sun-dried mud bricks (non-fire-burnt brick, generally called adobe), stone and concrete blocks. A large percentage of these buildings are currently associated with rural populations that have low economic resources. Furthermore, a large portion of the existing earth constructions is now located in regions where seismic hazards cannot be disregarded [1].

Natural disasters are causing tremendous loss of life and property with earthquakes being the most serious risk. Loss of life in earthquakes mostly occurs due to collapse of buildings and non-engineered dwellings. Single-family houses are almost always built without the supervision of a professional engineer and are more likely to suffer damage during a seismic event. Generally, these type houses are usually adequate for withstanding the gravity loads, but grossly inadequate to withstand the lateral inertia loads imposed by earthquakes. About 75 % of the fatalities attributed to earthquakes are caused by the collapse of buildings and the greatest proportion is from the collapse of masonry buildings [2]. In order to reduce damage on these masonry buildings during earthquakes, which could happen anywhere in the world, it is important to examine at the early stage how to improve and upgrade the earthquake resistance of an existing masonry construction and to propose a concrete countermeasure method. Before the proposal of the earthquake-proof technique intended for the masonry construction, it is important to consider that many of the people living in those earthquake-prone regions belong to the poorest segment of the society.

2 Meshtype Retrofitting Methods

For the seismic safety of the structure, good connections between walls and floors or foundations, between adjacent walls and between walls and roof are essential. Integrity of masonry can prevent large pieces of debris to fall out and

✉ Navaratnarajah Sathiparan
nsakthiparan@yahoo.com
http://www.eng.ruh.ac.lk/CEE/index.php/staff/academic-staff/23-staff/staff-cv/134

[1] Department of Civil and Environmental Engineering, University of Ruhuna, Matara, Sri Lanka