

RESEARCH ARTICLE

Mechanical behavior of masonry strengthened with coir fiber reinforced hydraulic cement mortar as surface plaster

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Abstract

Among the world population, a large proportion across the world still lives in masonry structures. The main problem in unreinforced masonry structures is its weakness against dynamic loads. This paper presents the proposal of the new retrofitting method using natural fiber added mortar as the surface plaster for masonry structures. Thus, the present study focuses on the experimental evaluation of a masonry prism with natural fiber reinforced mortar. The main reasons for the use of coconut coir as a natural fiber are richly available in locally and are fairly cheap. In this paper, the effects of coconut coir reinforced mortar mix, including different fiber content on compressive, shear and flexural bending behavior of masonry prisms is investigated through a comprehensive experimental study. Although this technique shows an average performance, due to the facts of low cost, local availability and relative simplicity of technique, this method may potentially be able to use to prevent the brittle collapse of unreinforced masonry structures under moderate seismic loading.

Keywords

Masonry; Natural fiber; Coconut coir; Seismic retrofitting; Ductility

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1. Introduction

Among the world population, a large proportion of the world still lives in masonry structures due to its low cost and social and cultural acceptance. The main problem in unreinforced masonry structures is its vulnerability against dynamic loads, differential foundation settlements, etc. Most of these masonry structures have not been constructed considering seismic loads. Past earthquakes have provided enough evidence that many such buildings are seismic vulnerable and therefore an even moderate earthquake can result in massive death and casualties.

In the past years, the vast majority of these earthquakes were located at the boundaries of major tectonic plates which move relative to each other and those countries that unfortunately lie close to these boundaries were the most vulnerable ones as exemplified by the Japanese Islands, Indonesian Islands, and Philippines. Since Sri Lanka lies in the large Indo-Australian plate far away from any of the plate boundaries and therefore many people believe that it makes Sri Lanka safe from earthquakes. But according to the recent geological studies, it has found that a new plate boundary has formed separating the Indo - Australian plate into the Indian plate and Australian

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