



Effect of Wet Condition and Aggregates Type Used in Cement-Based Blocks on Mechanical Behavior of Masonry

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Abstract: Water penetration into masonry walls can occur in the masonry structures during the rainy climate. Water penetration not only causes discoloration or efflorescence but also can be damaging to material property. Even though several studies from past literature focus on wet conditions effect on brick masonry, but there is limited study on cement block masonry. The present research aimed to evaluate the effect of wet conditions on the mechanical characteristic of cement block, binder mortar and masonry. Where three types of fine aggregates, namely river sand, lateritic soil and manufactured sand were used for masonry block production. For binding mortar, two mortar classes M2 and M6 according to British Standard European Norm were used. Compression, flexural bending, and splitting tensile tests for blocks and binding mortar were performed in dry and wet conditions. Also, compression, direct shear and bond test were performed on masonry prisms in dry and wet conditions. The results demonstrate that a considerable amount of strength reduction was observed in wet conditions. In wet conditions, cement-soil block masonry showed a higher reduction in compression strength and bond strength, but showed lesser shear strength reduction when compared with the other two masonry types. Overall, cement-river sand block masonry has shown better performance in wet conditions.

Keywords: Masonry, moisture, river sand, lateritic soil, manufactured sand

1. Introduction

Masonry is normally a highly durable material form of construction. However, the materials used for the masonry, the quality of the mortar and workability, and the pattern in which the masonry units are assembled can substantially affect the strength and durability of the overall masonry structure. On the other hand, the severity of the environmental exposure such as water immersion, wet and dry cycling, freeze and thaw cycling and chemical attacks also severely affect the strength and durability of the masonry structures [1]. Water penetration into masonry walls can occur in the masonry structures during the rainy climate. Water penetration not only causes discoloration or efflorescence but also can be damaging to material properties.

There are intensive studies on moisture effect on construction materials such as concrete [2-5], fired clay brick [6-9] and soil block [10,11]. These studies showed that the compressive strength of construction material in wet condition have lower compressive strength than in dry condition. Also revealed that the compressive strength of the materials decreases gradually with the increased moisture content. For moisture effect on masonry structures, the majority of the studies were conducted on fired brick masonry.