



Using Mortar Infiltrated Fiber Concrete as Repairing Materials for Flat Slabs

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Abstract

This search aims to study and test the effect of using a new material (mortar infiltrated fiber concrete) as repair material in crucial regions that need a special type of repair like (deck of bridges, pavements, and defense structures). This work consisted of three stages: the first stage; testing the engineering properties of slurry infiltrated fiber concrete (compressive, splitting tensile, flexural and bond strengths), by using different types of fibers (End hooked steel fiber, Micro steel fiber, Polypropylene fiber, and Synthetic fiber), in five different types of mortar infiltrated fiber concrete mixes (with a volumetric ratio of fiber 6%), and the age of test was 28 days. After studying the behavior of these mixes in these tests, the second stage of this study was concluded casting reference slab with dimensions 900×900×80 mm from normal strength concrete and repairing two sets of damaged slabs (with dimensions 900×900×50 mm, the first set consist of five slabs damaged in the compression zone, and the second set consist of five slabs damaged in tension zone), the two sets repaired with repair layer from mortar infiltrated fiber concrete with thickness 30 mm. The third stage of the study was testing the effect of the repair material (mortar infiltrated fiber concrete) on the flexural behavior of the repaired slab specimens in (flexural strength, deflection characteristics, and ductility), through using a hydraulic jack with a four-point load system. The results of testing slab specimens indicated significant improvement in the flexural behavior of the repaired slab when compared with the reference slab, the slabs repaired in the compression zone recorded increasing in range 2-39% in ultimate load and the slabs that repaired in tension zone recorded 4-71% increasing in ultimate load. Also recorded better deflection values through testing the slabs specimens that repaired. The ductility of the repaired slab specimens increased significantly from 25 to 91% compared with the reference slab specimens. These results indicated excellent effect mortar infiltrated fiber concrete as a perfect repair material for slabs that damaged in compression and tension zones.

Keywords: Mortar Infiltrated Fibre Concrete; Flexural; Repair; Slab; Damage; Deflection; End Hooked Fiber; Hybrid.

1. Introduction

Despite many advantages in using ultra-high-performance concrete, like increasing the compressive strength, the material still brittle, the fibers in general increased the tensile strength plus increasing ductility. The volume of fibers in fiber reinforced concrete ranging from 1 to 3%, due to the problems that initiated from the interlock of high quantity of fibers [1].

Rapid structural failures, which depending on several reasons, necessitated the urgent need to develop a durable material capable of repairing, retrofitting, and restoration workings. As a solution, experimentalists have created mortar infiltrated fiber concrete [2].

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