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Flexural response and crack development properties of ferrocement panels reinforced with steel fibers

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Abstract

Effect of partial replacement of cement with silica fume on flexural strength and cracking of ferrocement simply supported panels reinforced with steel fiber and wire mesh was explored. For the purpose of this study, various dosages of silica fume and steel fiber were mechanically mixed with reference mortar. The ferrocement panel specimens were prepared with 1, 2, and 3 layers of galvanized wire mesh. The water-cement ratio was fixed at 0.35 for all the test specimens. The main objective of this study is to evaluate the 28-day flexural strength of simply supported panels by laboratory center point flexural tests. The results of 15 simply supported ferrocement panels indicated that the fabricated ferrocement panels with silica fume content up to 15% by binder weight exhibited superior flexural performance as compared to the control ferrocement panels with no silica fume content. Flexural performance parameter used for comparison was flexure stress–deflection response. The number of cracks developed at failure was also taken into account with measurements of average crack width and crack spacing. It was further revealed that for a 15% cement replacement with silica fume and 4% steel fiber addition in mortar mix, approximately 3.6-fold increase in 28-day flexural strength was observed when compared to the conventional mortar. In summary, inclusion of 4% steel fibers in a mortar of fabricated ferrocement panel improved the crack resistance and flexural capacity.

Keywords:

Ferrocement; Mid span; Silica fume; Steel fiber; Flexural strength

1. Introduction

1.1. Ferrocement

A ferrocement element is a thin walled mortar which is produced by cement as a binder, sand as fine aggregate and water reinforced with spaced layers of small diameter wire mesh (Chee and Ramil [1]; Jayasree et al. [2];

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