



Influence of Voids Ratio on Impact Behavior of Circular Ferrocement Slabs

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Received 29 October 2018; Accepted 08 January 2019

Abstract

The objective of using materials is to fully utilize the properties of these materials in order to obtain the best performance of the structure. The merits of material are based on many factors like, workability, structural strength, durability and low cost. Ferrocement is an excellent construction system. This paper studies the behavior of ferrocement circular slabs under impact load. The experimental program include testing four sime fixed supported ferrocement circular slabs of 800mm diameter and 50mm thickness. The Influence of the use of styropor voids was investigated in different ratios (24% and 48%) and a number of wire mesh layers four and six layers. Impact load test results revealed that increasing number of wire mesh from 4 to 6 led to an increase in the impact energy for first crack by (41.991% ,37.62%) respectively when using voids ratio by (24% and 48%) respectively and impact energy for full perforation by (21.7% and 9.94%) respectively when using voids ratio by (24% and 48%) respectively. Ferrocement circular slabs are used in construction fields such as roofs, tanks, manholes, etc.

Keywords: Ferrocement; Circular Slabs; Impact Load; Voided slabs; Composite; Panel.

1. Introduction

Recently sandwich panels have gained much attention as an effective structural form in the building and construction industry. Sandwich panels have been used in the aerospace industry for many years and these are also being used as load bearing members in naval structures [1]. Sandwich panels offer high strength-to-weight ratio causing substantial reduction in the self-weight of the structures. The self-weight of the element with high density (weight) itself accounts for a major portion of the total load of the structure. Thus reduction in the self-weight of the structures by adopting an appropriate approach results in the reduction of element cross-section, size of foundation, cost and also the damages due to earthquake because the earthquake forces that will influence the buildings and other structures are proportional to the mass of the structure [2]. The use of sandwich panels with cores of lightweight concrete is spreading due to their manufacturing efficiency that leads to the industrialization of the building system [3]. Sandwich panels typically consist of two thin, high strength and density outside face sheets known as skin separated by a thick layer made of low strength and density material called as core [4]. Ferrocement laminated composite is also proved to be an effective material to produce skins of sandwich panels [5–9]. Ferrocement can be define as a type of thinning wall reinforced concrete usually comprised hydraulic mortar reinforced with closely spaced layers of continuous and relatively small wire mesh [10]. Ferrocement has a stiffness, punching shear, and a best impact resistance than reinforced concrete, because two dimensional strengthening of the wire mesh. So, before fall is subject to high deflections. It is durable, economic cost, lightweight, weather resistance, and its versatility for comparing with the reinforced concrete [11]. Circular slabs are generally used as base slabs for columns or cover slabs for circular storage tanks. The slab at failure will develop

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 <http://dx.doi.org/10.28991/cej-2019-03091230>

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