UNIVERSITI TEKNOLOGI MARA

STRENGTH AND BEHAVIOR OF STEEL FIBRE LIGHTWEIGHT CONCRETE WALL PANEL UNDER ONE WAY IN PLANE ACTION

NORFARIZA BINTI ISMAIL

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AUTHOR'S DECLARATION

I declare that the work in this dissertation was carried out in accordance with the regulations of Universiti Teknologi MARA. It is original and is the results of my own work, unless otherwise indicated or acknowledged as referenced work. This topic has not been submitted to any other academic institution or non-academic institution for any degree or qualification.

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Name of Candidate	:	Norfariza Bt Ismail
Candidate I.D. No.	:	2012679946
Programme	:	Master of Science in Structural Engineering
Faculty	:	Civil Engineering
Thesis Tittle	:	Strength and Behavior of Steel Fiber Lightweight Concrete Wall Panel under One Way in Plane Action

Signature of Candidate: .....

ABSTRACT

Nowadays, with the rapid development of high rise building, larger size and span concrete structures are required. Wall panel is a structural element that considered as a vertical load bearing member that carries weight from the roof to the ground floor and to the foundation. A lower density from lightweight concrete decreases the weight of the building. However, lightweight concrete having a lower module of elasticity has a faster rate of crack development in reinforced concrete members. By adding steel fibre, it will reduce the macro-cracking. The strength and behavior of steel fibre lightweight concrete, the ultimate load and crack pattern are investigated. This research was using sample size with constant on the height and thickness that is 600 mm and 40 mm respectively to give the constant slenderness ratio (SR=15). The length was varies from 320 mm, 400 mm, 560 mm and 800 mm provide the range of aspect ratio (AR = 1.875, 1.5, 1.07 and 0.75). Use 0.5% steel fibre of 35 mm length with 0.55 mm diameter and 30% Expanded Polystyrene (EPS). From this research, it has been found that the maximum deflection occurs at the wall panel with AR 0.75 that is 8.28 mm with an average ultimate load of 127.78 kN. The maximum lateral displacement for four (4) wall panels occured at the 0.5 wall height (0.5H) of wall panel that is at 300 mm height. Maximum crack length for each wall panels SFLWC-1 crack length is 30 cm at front, SFLWC-2 crack length is 25 cm at rear, SFLWC-3 crack length is 30 cm at rear and SFLWC-4 crack length is 55 cm at front. The crack pattern from this study shows a concrete crushing at the top and bottom of the wall panels. This shows that the failure at top support was due to applied load and at bottom end was due to support condition. Besides that, the panel with the low aspect ratio tends to fail by crushing, while a panel with high aspect ratio tends to fail by buckling. It concluded the strength and behavior of steel fibre lightweight concrete wall panel under one way in plane action has been revealed by determination of ultimate load, deflection profile, crack patterns, crack loading, failure modes, deformation profile and stress strain relationship as discussed.

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