بسم الله الرحمن الرحيم

شبكة المعلومات الجامعية

التوثيق الالكتروني والميكروفيلم

جامعة عين شمس

التوثيق الإلكتروني والميكروفيلم

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Ain Shams University
Faculty of Engineering
Structural Engineering Department

Behavior of Concrete Slabs Reinforced with Basalt Fiber Bars

A THESIS

Submitted in partial fulfillment of the requirement for the degree of Master of Science

By

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2019

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STATEMENT

This thesis is submitted to Ain Shams University, Cairo, Egypt, in partial fulfillment of the requirements for the degree of Master of Science in Civil Engineering (Structural).

The work included in this thesis was carried out by the author at reinforced concrete lab of the faculty of engineering, Mataria, Helwan University.

No part of this thesis has been submitted for a degree or qualification at any other university or institute.

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Cairo – 2019

ACKNOWLEDGEMENTS

The author wishes to express his sincere appreciation and deep gratitude to **Prof. Dr. Omar Ali Elnawawy,** professor, Structural Engineering Department, Ain Shams University, Cairo, Egypt, for his guidance kind supervision at each part of the thesis.

The author extends his sincere appreciation to **Dr. Yasser Samir Hassan,** professor, Structural Engineering Department, Ain Shams University, Cairo, Egypt, for his constant encouragement and fruitful supervision throughout the work.

The author is deeply indebted to **Dr. Khaled Sami Abdullah,** Assistant professor, Civil Engineering Department, New Cairo Institute, Cairo, Egypt, for his constant supervision, guidance, advice and encouragement during the progress of this research.

The author, also, wishes to express his thanks to all the staff of the Structural Engineering Department, especially that of the materials science laboratory in the Faculty of Engineering for their sincere help during this work.

Finally, I wish to thank all professor doctors for supervision on my thesis, their constant support and encouragement.

ABSTRACT

This thesis presents an experimental and investigation on the behavior of concrete slabs reinforced with basalt fiber bars. This research focused on the application of the BFRP-bars as reinforcement of concrete slabs. The polypropylene fibers were also added to the concrete mix to improve the behavior of the slabs. The experimental program was done at the Materials Testing Laboratory of the Faculty of Engineering Mataria, Helwan University, Cairo by using most of the materials available in the Egyptian market. Using imported BFRP-bars with diameters of 12 mm with a length of 2000 mm.

The experimental program examined the impact of different parameters on the behavior of the concrete slabs. These parameters were:

1. Bars type: Steel, and Basalt fibers.
2. Three reinforcement percentages: (0.57%, 0.75%, 0.94% respectively).
3. Quantity of polypropylene fibers: (0, 1.5 and 2kg/m^3) added to concrete.
4. Compressive strength of the concrete: (250, 300, 350 kg/cm^2).

The key test results demonstrated that the specimens, reinforced with BFRP-bars, had higher deflection and strain than it of the specimen reinforced with steel and consequently it had lower stiffness. The cracking and ultimate load of the specimens reinforced with BFRP-bars was lower than it of the specimen reinforced with steel.

On the other hand, adding the polypropylene fibers had a great effect on the mechanical characteristics of the concrete mix as it led to narrower and more uniformly distributed cracks, reduce the deflection and strain of the specimen, reinforced with BFRP-bars, by 51% and 61% respectively and increasing the ultimate load of these sample to 99% of the ultimate load of Steel Sample.

Finally, we can overcome the problem of the steel corrosion and saving high costs of periodic maintenance at cost increase of 60% only.

Keywords: BFRP-bars, RC slabs; reinforcement ratio; polypropylene fibers; Compressive strength of concrete. Compressive strength of the concrete;

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