بسم اللّه الرحمن الرحيم

شبكة المعلومات الجامعية

التوثيق الالكتروني والميكروفيلم

شبكة المعلومات الجامعية

جامعة عين شمس

التوثيق الإلكتروني والميكروفيلم

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AIN SHAMS UNIVERSITY
FACULTY OF ENGINEERING
STRUCTURAL ENGINEERING DEPARTMENT

BEHAVIOR OF ULTRA HIGH PERFORMANCE FIBER REINFORCED CONCRETE COLUMNS SUBJECTED TO ECCENTRIC COMPRESSION LOAD

A Thesis
Submitted in Partial Fulfillment of the
Requirements for the Degree of
MASTER OF SCIENCE IN
STRUCTURAL ENGINEERING

By
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B.Sc. in Civil Engineering, June 2013 – Ain Shams University

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STATEMENT

This thesis is submitted as partial fulfillment of the requirements for the Degree of Master in Science in Civil Engineering (Structural), Faculty of Engineering, Ain Shams University.

No part of the thesis has been submitted for a degree or a qualification at any other University or Institution.

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DEDICATION

To my father, mother and brothers

ABSTRACT

Novel developments in materials field led to the evolution of ultra high performance fiber reinforced concretes (UHPFRC), which is a material that provides superb mechanical properties and enhanced durability comparing with the traditional concrete. For its excellent properties, it has a high potential to be widely used in various structures from the sustainability and economically viewpoints.

The thesis presents a study for the behavior of eccentric short columns manufactured with UHPFRC. The experimental program was performed on seven UHPFRC columns until failure. Variables included the eccentricity to thickness ratio, the longitudinal steel reinforcement and stirrups reinforcement ratios. All columns had square cross sections with dimensions of 150 mm x 150 mm. Four columns were prepared to study the change of eccentricity to thickness ratio, two columns to study the change in longitudinal steel reinforcement ratio, and one column to study the effect of changing the stirrups reinforcement ratios. Failure modes and crack patterns, deformations and strains' behavior were recorded and compared.

The results demonstrated that the three mentioned variables significantly affect the ultimate load capacity of the UHPFRC columns. Theoretical prediction of the columns' ultimate load capacities according to different international codes were used to evaluate the experimental results.

Keywords: Ultra High Performance Concrete, Fiber Reinforced Concrete, Eccentric Loads, Short Columns, Load Capacity, Polypropylene Fibers.

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