AIN SHAMS UNIVERSITY
FACULTY OF ENGINEERING
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BEHAVIOR OF STEEL JACKETED REINFORCED CONCRETE COLUMN UNDER ECCENTRIC FORCES

BY

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STATEMENT

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

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

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Abstract of the MSc thesis submitted by
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ABSTRACT

RC columns often need strengthening to increase their capacity to sustain the applied load. Strengthening using concrete jacket, composite material and steel jacket are common different techniques applied in many scenarios. In this research, the behavior of RC columns with and without strengthening using steel jacketing subjected to different eccentricities of loads upon failure were studied.

To achieve the behavior of strengthened columns upon failure under eccentric loads, Six reinforced concrete columns of 1000 mm height & (200×200)mm cross section area and concrete compressive strength 38 N/mm2 with different strengthening techniques were tested under eccentric loads (small eccentricity and big eccentricity) in the RC laboratory of Ain Shams University (Faculty of engineering). The testing program divided into two groups of specimens, The first group (Group No. 1) consists of three specimens under small eccentricity (e = 7cm) with various steel jacketing

technique for each specimen (full steel tube jacket, partially steel jacket (4 angles for the column corners and 5 straps equally distributed throughout the column height) and also another partially steel jacket (4 angles for the column corners and 3 straps equally distributed throughout the column height). The second group (Group No. 2) consists of three specimens under big eccentricity (e = 15cm) having the same various steel jacketing technique of the first group.

Using F.E package (ANSYS 14.0) the behaviour of eight models were investigated, analysed and verified. This Program has wide varieties of elements, a large library for material properties and several load types which covers almost aspects needed to model the experimental work conducted in this thesis. Eight reinforced concrete column models having the same dimensions of experimental testing were modeled. In the theoretical program, two models were more than experimental specimens. These two models are reference model 1 (RC concrete without strengthening under eccentric load with 7 cm eccentricity) as a reference model for Group No. 1 and reference model 2 (RC concrete without strengthening under eccentric load with 15 cm eccentricity) as a reference model for Group No. 2.

The results showed a good match between both experimental tests and F.E models.

Key Words: Columns, Steel jacket techniques of RC columns, Eccentric load, Big eccentricity, Small eccentricity and Non-linear structural analysis.

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