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AIN SHAMS UNIVERSITY
FACULTY OF ENGINEERING
STRUCTURAL ENGINEERING DEPARTMENT

Behaviour of exterior beam column joints with coupled reinforcement

BY

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A Thesis submitted in Partial Fulfillment of the Requirements of the Degree
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Master of Science in Structural Engineering

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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 Structural Engineering.

The work included in this thesis was carried out by the author

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

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ABSTRACT

Exterior corner beam column joint is a critical region in reinforced concrete structures where through it, large stresses to and from the adjoining members are transferred. The breakdown of this joint always causes a failure of the structure, as well it is very difficult to repair this joint compared to any other structural element. Many structural problems arising in the knee joint, such as deficiencies in mechanical properties due to rebar cold bending and the problems of congestion of the joints as a result of the splicing of the reinforcing bars. In order to overcome these problems, the present study examined the structural behavior of knee joint, subjected to closing quasi-static loads, with new use of L-shaped mechanical coupler to connect the perpendicular main tension reinforcing bars instead of bending it or splicing the rebars. Eight full-scale specimens divided into four groups were tested. Each group consists of two specimens, a conventional and a proposed reinforcement detail specimen. The parameters also include the effect of concrete grade and presence of horizontal and vertical stirrups in the knee joint. The results of this study showed that, with the use of L-shaped mechanical coupler, significant increase in ductility, efficiency, performance and load carrying capacities were occurred.

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