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شبكة المعلومات الجامعية

التوثيق الالكتروني والميكروفيلم



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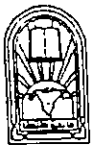


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بالرسالة صفحات

لم ترد بالأصل



Tanta University
Faculty of Engineering

EXPERIMENTAL AND ANALYTICAL INVESTIGATION ON REINFORCED HIGH STRENGTH CONCRETE BEAM-COLUMN JOINTS

A Thesis Submitted for the Partial Fulfillment
of the Requirements for the Degree of

MASTER OF SCIENCE
In
STRUCTURAL ENGINEERING

By

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Demonstrator, Faculty of Engineering, Tanta University
B. Sc. Civil Engineering, Tanta University, 1998

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ABSTRACT

Beam-column joint is one of the most important structural elements in reinforced concrete structures. It has been the subject of intensive research for the last four decades. So far, most of the design procedures of joints have been devoted to ordinary strength concrete as implemented in the current international design codes.

The use of high strength concrete has become eminent because of the advantages of member size limitation and higher structural capacity. However, its applicability is still limited because its behavior especially under combined stresses and shear is different from that of the ordinary strength concrete; in addition, the existing design guidelines are not completely applicable to high strength concrete.

In order to establish the salient features of the behavior of high strength concrete beam-column joints, modes of failure, deformational characteristics, strength parameters and strain development, full scale experimental program has been performed on type I exterior beam column joint. The influence of axial compression along with other actions imposed on the joint including shear and bending moment has been taken into consideration. The practical aspects of composite combination induced through using ordinary strength concrete of different grades at the floor level and high strength concrete along the rest of the column have been contemplated.

In order to conduct an extensive parametric study, nonlinear three-dimensional finite element analysis has been carried out. The computational model has been verified and validated against several experimental testings. The numerical work has aimed at providing more insight about the behavior and figuring out the fundamental mechanisms of load transfer within the joint. The effects of different permutations of longitudinal as well as transverse reinforcement and various configurations of stirrups have been also investigated. Finally, the concepts of self-designing structures are applied in an interactive scheme in order to figure out the fundamental load transfer path. The findings are implemented in modifying the Vollum and Newman (1999) strut and tie model for practical applications.

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