DEVELOPMENT OF METHODS OF SOLUTION FOR BIAXIALLY LOADED SECTIONS IN ACCORDANCE WITH THE EGYPTIAN CODE OF PRACTICE

By

Amr Kamal Mahmoud Merekap

A Thesis Submitted to the
Faculty of Engineering at Cairo University
In Partial Fulfilment of the
Requirements for the Degree of

MASTER OF SCIENCE
IN
STRUCTURAL ENGINEERING

FACULTY OF ENGINEERING, CAIRO UNIVERSITY
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Under the Supervision of

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Title of Thesis:

Development of Methods of Solution of Biaxially Loaded Sections In Accordance with Egyptian Code of Practice.

Key Words:

Biaxially Loaded Sections, Load Contour Method, Equivalent Eccentricity Method, Strain Compatibility Method, Egyptian Code of Practice.

Summary:

Concrete design codes provide several approaches for the design of concrete sections subjected to axial loads and biaxial bending moments. The Egyptian code of practice ECP 203 provides two different approaches. A detailed investigation for these two approaches was carried out in this study. It was concluded that the two approaches have drawbacks, preventing them from being used for designing general sections subjected to axial loads and biaxial bending moments. This presented a need to develop a new approach in the Egyptian code of practice, applicable of designing any general rectangular section without restraints on reinforcement distribution. A study was carried out on different design codes such as the British Standards BS-8110, American Concrete institute ACI 318, Euro Code EC-2 and Indian code. It was recognized from the study that the most common approaches are the load contour method and the equivalent eccentricity method. In this research a parametric study was carried out using those two approaches to propose and evaluate an improved function for the alpha factor used in the load contour method. The beta factor that is used in equivalent eccentricity method was derived from the alpha factor. The new approaches are proposed to the Egyptian code committee for discussion in order to be addressed in the upcoming editions of the Egyptian code.

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Dedication

I dedicate this work to
My parents *who had the tolerance, wisdom, kindness, decency and enough guidance to put me on the right path and urged me to stand up against obstacles with confidence and never give up; for they have always been my backbone, my motivation and my inspiration.*
May God bless them.

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