EVALUATION FOR SOME ASPECTS OF EGYPTIAN STANDARD SPECIFICATIONS FOR METALLIC STRUCTURES AND BRIDGES AND THE STUDIES REQUIRED FOR THE SUGGESTED ALTERATIONS

Thesis Submitted to Ain Shams University for The Master of Science Degree in Structural Engineering

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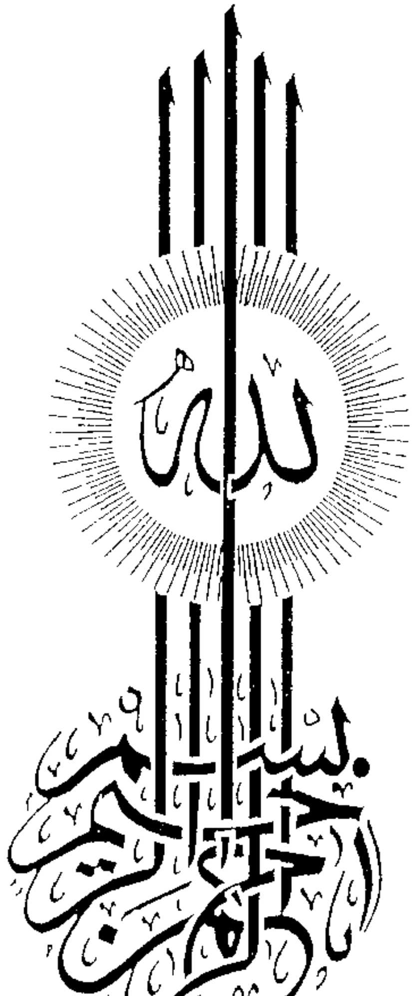
To my father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ABSTRACT

This thesis aims at revealing aspects of deficiency in some items of the Egyptian specifications for steel structures and bridges (ESS) through comparison with their universal specifications counterparts, such as the American specifications (AISC), the German (DIN), the French (CM 66), the Swiss (SIA), the European (ECCS), Japanese (AIJ), and British (B.S. 449).

The seventies of this century witnessed the introduction of many suggestions which resulted in substantial amendments on some of the items of these specifications. The present work comprises a discussion of some of these suggestions each in its place.

Chapter (1) provides a concise introduction to the subject, while chapter (2) treats the tension members design requirements and comprises a discussion which proved that the (ESS) conforms with some of the universal specifications, except that the allowable stresses should be specified in terms of the yield stress.

Chapter (3) comprises a detailed comparative study between the (ESS) and those of other universal specifications. The study revealed that the (ESS), as well as many other codes which apply the bifurcation theory, are far from proper considerations. Thus, the curves suggested here were based on limit states design, which gives the same safety margin for various

compression members. It has been shown also that the theory on which the local buckling provisions of the (ESS) were based, is still under dispute. Therefore, other simple and more safe provisions are here proposed. Suggestions and amendments to the specifications of the built-up columns, are also made.

Chapter (4) shows that the (ESS) do not give any recommendations concerning the design of laterally unsupported beams. Thus a comparative study of the recommendations of other codes was made, which proved that specifications which apply the bifurcation theory provide inapproperiate equations. Therefore, here also suggestions on limit states design are made. Provisions against web crippling of rolled beams are also introduced, since they are missing in the (ESS). Also a definition of beams which can achieve full plastic moment (compact sections) is outlined.

Chapter (5) shows that the linear buckling theory of plates which is the basis of the (ESS) plate girder design, is inadequate. The Cardiff method which is based on the ultimate analysis was found appropriate in this respect. However, the (AIJ) recommendations which though based on the linear buckling theory, are recommended.

Chapter (6) comprises a comparative study of the universal mannual procedures for the evaluation of the effective column lengths in continuous frames. In view of this comparison, it is suggested to apply the

(AISC) nomographes. It is found that the (ESS) beams-columns design is inadequate and thus the (AISC) procedure is recommended.

Chapter (7) is a synthesis of all the suggested recommendations for a new Egyptian specifications. It also includes a conclusion of the whole work.

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