AIN SHAMS UNIVERISTY
FACULTY OF ENGINEERING

SKEW ANGLE EFFECT ON THE GENERAL BEHAVIOR OF R.C. BOX GIRDER BRIDGES

By

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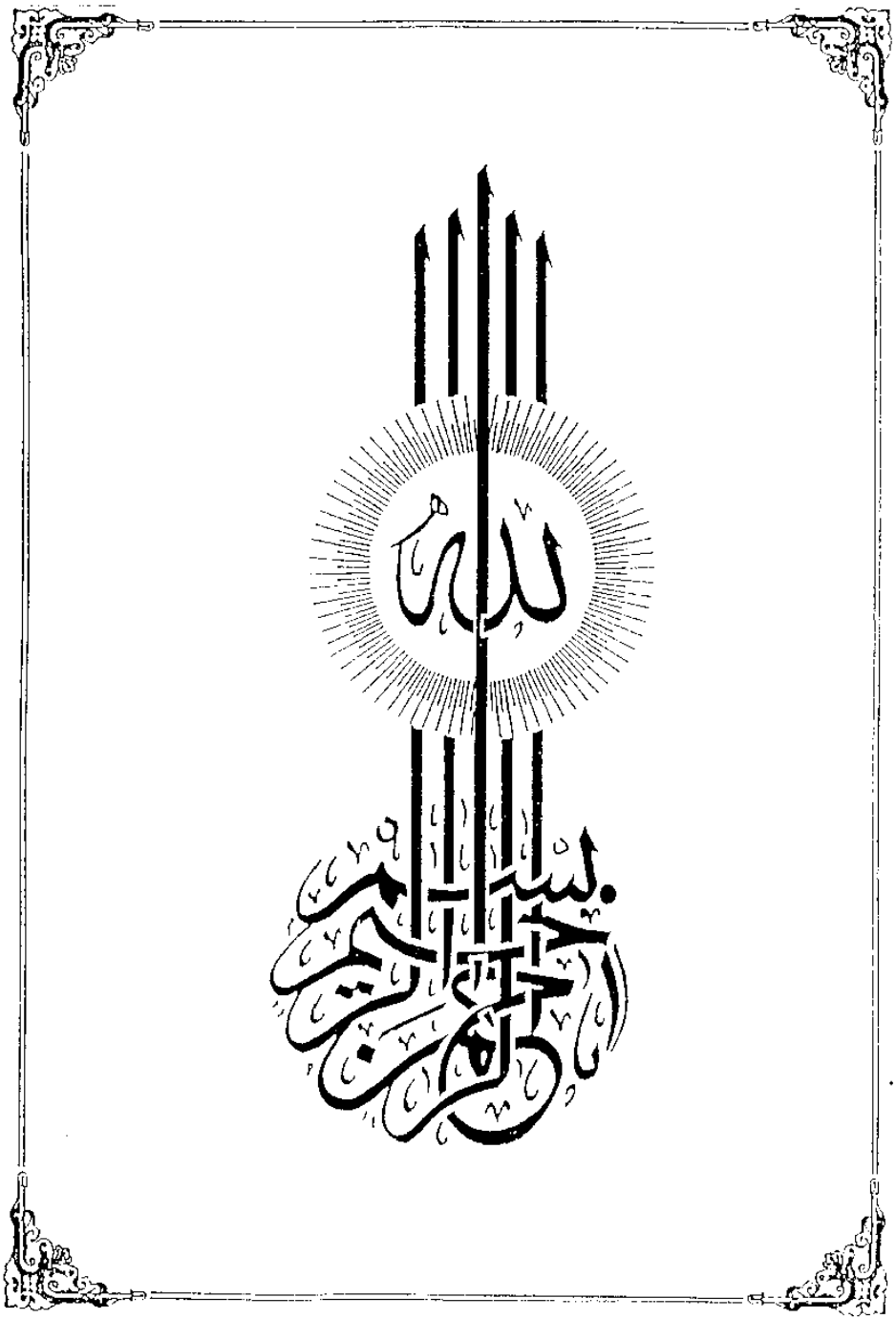

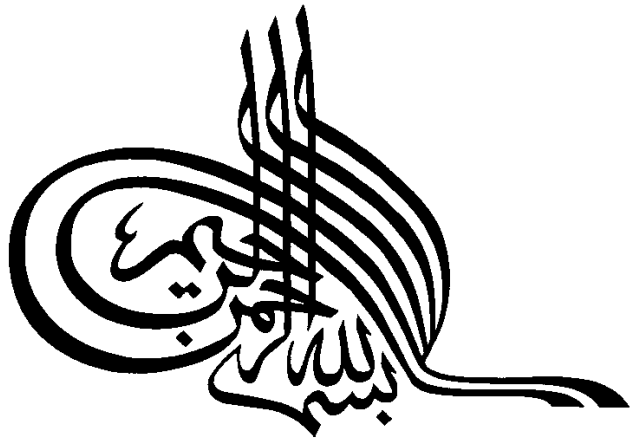

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STATMENT

This dissertation is submitted to Ain Shams University for the degree of MASTER OF SCIENCE in structural engineering.

The work included in this thesis was carried out by the author in the department of civil engineering (Structural Division), Ain Shams University, from November 1994 to October 1997

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

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Eng. Hatem Shaker El-Behairy

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ABSTRACT

The skew bridge is one whose longitudinal axis forms an acute angle with the abutment. This thesis deals with the study of the general deformational behavior of R.C. box girder bridges with different skew angles and cantilever widths, under the combined action of bending, shear, and torsion stresses, from zero up to the failure load. The thesis also deals with the effect of varying the skew angle and the cantilever width on the torsional and distorsional behavior of R.C. box girder bridges.

The experimental results obtained from testing six R.C. box girders of direct medium scale models are presented. All girders have the same dimensions and the same reinforcement in both longitudinal and transverse directions but with different skew angles and cantilever widths. The tested specimens were loaded by single concentrated eccentric load acting at the mid span section of the outer web to investigate the effect of varying the skew angle and the cantilever width.

In the theoretical phase of this thesis, the three box girder bridges were analyzed using the finite element analysis taking into consideration the non-linear stress - strain curve of concrete and steel.

The results of the experimental and the theoretical investigations, including deflections, strains, cracking and failure loads are presented and compared.

Finally, the results of this experimental -theoretical study were combined with other available information to formulate some recommendations for the analysis and design of skew box girder bridges.

KEYWORDS:

Reinforced concrete, Bridges, Box girder section, Skew angle, Torsion, Distortion, Crack pattern, cantilever width.

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