Ain Shams University
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INSTABILITY ANALYSIS OF PLATE GIRDERS USING THE FINITE ELEMENT TECHNIQUE

By

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A THESIS

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STATEMENT

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 Departement of Structural Engineering , Ain Shams University , from April 1989 to May 1990.

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

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TO MY FAMILY

AND MY WIFE

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ABSTRACT

In the present thesis an analytical study on the buckling of plate girders webs is investigated using the finite element method through out two main computer programs. The first is the powerful computer package "SAP 80", which is used to solve the large number of equations of the finite element model, to obtain the distribution of stresses through the different elements of the model. While the second is specially prepared to get the buckling factor of safety of the plate girders webs under the actual forces obtained from the first program analysis.

The web plate, the flanges and stiffeners and the fasteners are simulated in the finite element model by equivalent isotropic plate elements, plane frame elements and plane truss members respectively.

A parametric study shows the effect of web height, web thickness, cases of loading and the horizontal stiffener location on the factor of safety against buckling of the web panels or sub-panels, is represented.

A comparison between the factors of safety against web-panels buckling obtained by the suggested finite element model and those obtained by some universal specifications such as Egyptian Standards (E.S.S), German Specifications (D.I.N.), Japanese standards (A.I.J.), and the new British Standards (B.S.5400), is made for all the studied cases.

<u>CONTENTS</u>

LIST OF FIGURES