

A Major Project Report on
**BUCKLING AND POST BUCKLING ANALYSIS OF THIN
PLATES**

Submitted in Partial Fulfillment for the Award of the Degree of
MASTER OF TECHNOLOGY

IN
STRUCTURAL ENGINEERING

By

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CERTIFICATE

This is to certify that **Sujeet Kumar**, a student of final semester M.Tech (Structural Engineering), Department of Civil and Environmental Engineering, during the session 2010-2012 has successfully completed the project work on "*Buckling And Postbuckling Analysis Of Thin Plates*" under my guidance and supervision and has submitted a satisfactory report in partial fulfillment for the award of the degree of Master of Technology.

The assistance and help received during the course of investigation have been fully acknowledged. He is a good student and we wish him good luck in future.

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Declaration

I Certify that

- a. The work contained in this thesis is original and has been done by me under the guidance of my supervisor.
- b. The work has not been submitted to any other Institute for any degree or diploma.
- c. I have followed the guidelines provided by the University in preparing the thesis.
- d. I have conformed to the norms and guidelines given in the Ethical Code of Conduct of the Institute.
- e. Whenever I have used materials (data, theoretical analysis, figures, and text) from other sources, I have given due credit to them by citing them in the text of the thesis and giving their details in the references.

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Nomenclature

The various notations and symbols used in the text or in the figures have been enlisted below for ease of reference. Symbols not contained in the list have been explained in the sections when they appear first.

a, b dimension of the plate

e Amplitude of initial geometric imperfection

E Longitudinal Young modulus

G Shear modulus

h Thickness of the isotropic plates

m, n Positive odd integers

\bar{N}_x and \bar{N}_y Applied forces along x and y axes

\bar{N}_{xcr} Buckling load

u, v In-plane displacements

w Out-of-plane displacement

x, y, z Cartesian coordinates

ϵ Strain

Abstract

This work presented the effects of buckling and postbuckling behavior of rectangular plate under uniaxial loading. An overview of past research is presented, and several key findings and behavioral characteristics are discussed. These findings include the effects of shape, eccentricity, aspect ratio, loading, and boundary conditions. Some over all important findings of these studies are that plates that loads for corresponding plates with different boundary condition and uniaxial loading in buckling and post buckling load-carrying capability. The critical buckling load is obtained adopting Galerkin's approximation. The postbuckling equilibrium path is obtained by solving non linear algebraic equation with the help of Newton –Raphson method. The Von Karman theory is used for non linearities and initial geometric imperfections.

Keywords: Buckling, Postbuckling, Geometric imperfection, Galerkin method, Newton-Raphson method, Von Karman theory.

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