A Major Project Report on

Post-Buckling analysis of Plates subjected to in-plane loads using a Semi-analytical method

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 **Mr. Pankaj Kumar Mishra**, 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 "Post-buckling analysis of plates subjected to in-plane loads using a semi-analytical method." 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.

Dr. Sarat Kumar Panda

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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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2. Definition of symbols used

Symbol	Description
a	length of the plate
b	breadth of the plate
t	thickness of the plate
α	aspect ratio(= a/b.)
E	Young's modulus
v	Poisson's ratio
D	flexural rigidity (bending rigidity) $\left(= \frac{\mathrm{E}t^3}{12\left(1-\nu^2\right)} \right)$
M, N	maximum half-wave number of the assumed added deflection function in the *x* and *y* directions
w	(added) deflection of the plate due to the action of external loads
w_0	initial deflection of the plate
F	Airy's stress function
p	lateral (out of plane) pressure load on the surface area
z	axis direction normal to the *xy* plane.
P_x	axial force in the *x* direction $\left(= \sigma_{xav} bt \right)$
P_y	axial force in the *y* direction $\left(= \sigma_{yav} at \right)$

σ_x, σ_y	normal stresses in the *x* and *y* directions
$\sigma_{xav}, \sigma_{yav}$	mean stresses in the *x* and *y* directions
σ_{bx}, σ_{by}	bending stresses in the *x* and *y* directions
σ_0	yield stress for the plate
σ_{rx}, σ_{ry}	welding induced residual stresses for the plate in the *x* and *y* directions
$\tau = \tau_{xy}$	shear stress

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