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Unit 6 - Week 4 : Approximate Solution Techniques and 3D solution

Course outline

How to access the portal

Assignment 0: Basics

Week 1 : Basic Terminology, Equations and Methods

Week 2 : Derivation of Classical Plate Equations

Week 3 : Analytical Solution - Navier and Levy for Bending Case

Week 4 : Approximate Solution Techniques and 3D solution

- EKM and Buckling of Plates
- 3D Solutions
- Matlab Coding + ABAQUS
- Tutorial 4 : Levy Solutions

Assignment No. 4

The due date for submitting this assignment has passed.
As per our records you have not submitted this assignment.

Due on 2018-09-12, 23:59 IST.

1) Consider an isotropic plate $(E = 46GPa, \nu = 0.3)$ with edges $y = 0$ and $y = b$ as simply supported while $x = 0, x = a$ are clamped respectively. ***1 point***
Given material data and governing equation

$$D(W_{n,xxxx} - 2\overline{n}^2 W_{n,xx} + \overline{n}^4 W_n) = q_0$$

Subjected to the boundary conditions $w_0 = 0, w_{0,x} = 0$ on edges $x = 0, a$.
Considering $m = n = 1, h = 0.01m$

$$w = \sum_{n=1}^{\infty} W_n(x) sin\, \frac{ny\pi}{b};\ W_n = W_n^h + W_n^P$$

$$W_n^h = (A_n + B_n x)cosh(\lambda x) + (C_n + D_n x)sinh(\lambda x)$$

$$W_n^P = \frac{4q_0 b^4}{m^5 \pi^5 D}$$

Since there are four roots $(\lambda_1, -\lambda_1, \lambda_1, -\lambda_1); \lambda = \lambda_1$
$\overline{n} = \frac{n\pi}{a}$; $a = b = 1m$. The plate is subjected to uniformly distributed load $q_0 = 20N/m^2$

Four roots are:-

- $\pi, -\pi, \pi, -\pi$
- $2\pi, -2\pi, 2\pi, -2\pi$
- $2, -2, 2, -2$

2) Evaluate Particular solution for $m = 1(W_n^P m)$ **1 point**

- $6.205 * 10^{-4}$
- $6.205 * 10^{-5}$
- $3.102 * 10^{-5}$
- $3.102 * 10^{-4}$

No, the answer is incorrect.
Score: 0

Accepted Answers:
$6.205 * 10^{-5}$

3) First constant A_1 **1 point**

- $7.206 * 10^{-5}$
- $-3.102 * 10^{-5}$
- $-3.102 * 10^{-4}$
- $-6.205 * 10^{-5}$

No, the answer is incorrect.
Score: 0

Accepted Answers:
$-6.205 * 10^{-5}$

4) Second constant B_1 **1 point**

- $14.05 * 10^{-4}$
- $7.025 * 10^{-4}$
- $-1.405 * 10^{-4}$
- $-0.705 * 10^{-4}$

No, the answer is incorrect.
Score: 0

Accepted Answers:
$-1.405 * 10^{-4}$

5) Third constant C_1 **1 point**

- $4.472 * 10^{-5}$
- $44.72 * 10^{-5}$

$2.236 * 10^{-5}$

$22.36 * 10^{-5}$

No, the answer is incorrect.
Score: 0

Accepted Answers:
$4.472 * 10^{-5}$

6) Fourth constant D_1 ***1 point***

$15.32 * 10^{-4}$

$7.66 * 10^{-4}$

$-7.67 * 10^{-5}$

$1.532 * 10^{-4}$

No, the answer is incorrect.
Score: 0

Accepted Answers:
$1.532 * 10^{-4}$

7) Maximum deflection at $m = 1, n = 1$ at $x = 0.5, y = 0.5$ ***1 point***

$4.657 * 10^{-6}$

$18.315 * 10^{-6}$

$9.315 * 10^{-6}$

$-18.315 * 10^{-6}$

No, the answer is incorrect.
Score: 0

Accepted Answers:
$9.315 * 10^{-6}$

8) Maximum moment M_{xx} for $m = 1, n = 1$ at $x = 0, y = 0.5$ ***1 point***

0.788

1.476

-1.476

-0.788

No, the answer is incorrect.
Score: 0

Accepted Answers:
-1.476

9) Maximum moment M_{yy} for $m = 1, n = 1$ at $x = 0, y = 0.5$ ***1 point***

0.443

-0.443

0.886

-0.886

No, the answer is incorrect.
Score: 0

Accepted Answers:
-0.443

10)If thickness of plate is doubled then the bending stiffness D will ***1 point***

Decrease by 2 times

Increase by 2 times

Increase by 8 times

Dcerease by 8 times

No, the answer is incorrect.
Score: 0

Accepted Answers:
Increase by 8 times

Previous Page End