UNIVERSITY OF ASIA PACIFIC
Department of Civil Engineering

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CE 416: Structural Engineering Sessional III (Section-B)

Assignment

On

Topic: Design of Folded Plate

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Design of Folded Plate

A folded plate with two folds AB and BC is subjected to moments in the plane of the plates, Using the following data. Calculation of the stress in folded plate is given,

Given,

Thickness, $t_1 = t_2 = (75+62)\,mm$

$= 137\,mm$

Depth, $h_1 = h_2 = (1.5 + 0.09 \times 62)\,m = 3.28\,m$

Moment in Plates $= (200 + 5 \times 62)\,kN\text{-}m$

$= 510\,kN\text{-}m$

Step 01:

$$z_1 = z_2 = \frac{t \times h^2}{6} = \frac{137 \times (3.28)^2 \times 1000^2}{6} = 361.62 \times 10^6\,mm^3$$

Step 02:

$$A_1 = A_2 = t \times h = 137 \times 3.28 \times 1000 = 595260\,mm^2$$

Step 03:

$$\frac{M_1}{z_1} = \frac{M_2}{z_2} = \frac{510 \times 10^6}{361.62 \times 10^6} = 1.41$$

Step 04:

Edge Shear Force, $T_A = T_E = 0$,

$$\frac{T_A}{A_1} + 2T_B \times \left[\frac{1}{A_1} + \frac{1}{A_2}\right] + \frac{T_E}{A_2} = -\frac{1}{2} \times \left[\frac{M_1}{z_1} + \frac{M_2}{z_2}\right]$$

$$\Rightarrow 2T_B \times \left[\frac{1}{A_1} + \frac{1}{A_2}\right] = -\frac{1}{2} \times \left[\frac{M_1}{z_1} + \frac{M_2}{z_2}\right]$$

$$\Rightarrow 2 \times T_B \times \left[\frac{1}{595260} + \frac{1}{595260}\right] = -\frac{1}{2} \times [1.917 + 1.91]$$

$$\therefore T_B = -122209.15\ N$$

Step 05: Resultant Stresses.

$$\sigma_B = \frac{M_1}{Z_1} + \frac{T_B}{A_1} + \frac{T_B h_1}{2Z_1}$$

$$= 1.91 + \frac{-122209.15}{595260} + \frac{-122209.15 \times 3.28 \times 1000}{2 \times 361.69 \times 10^6}$$

$$= 0$$

$$\sigma_A = -\frac{M_1}{Z_1} + \frac{T_B}{A_1} - \frac{T_B . h_1}{2Z_1}$$

$$= -1.91 + \frac{-122209.15}{595260} - \frac{-122209.15 \times 3.28 \times 1000}{2 \times 361.69 \times 10^6}$$

$$= -0.705\ N/mm^2\ [\text{Tension}]$$

$$\sigma_C = \frac{M_2}{Z_2} - \frac{T_B}{A_2} + \frac{T_B h_2}{2Z_2}$$

$$= 1.91 - \frac{-122209.15}{595260} + \frac{-122209.15 \times 3.28 \times 1000}{2 \times 361.69 \times 10^6}$$

$$= 0.705\ N/mm^2\ [\text{Compression}]$$