Answers – VOLUME 2: STRESSES, STRAINS, DISPLACEMENTS

Chapter 5, Shear Forces and Shear Stresses Due to Bending

problem 5.024, page 391

Remarks: See §4.4, pages 168 till 170 See §5.4, pages 310 till 367

Answer:

$$\frac{\sigma_{\text{max}}}{\tau_{\text{max}}} = 2\frac{\ell}{h} = 30$$

Explanation:

Critical loads:

 $M_{\text{max}} = \frac{1}{4}F\ell$ At the force's point of application

 $V_{\text{max}} = \frac{1}{2}F$ At the support points

$$\sigma_{\text{max}} = \frac{M_{\text{max}} z_{\text{max}}}{I_{zz}} = \frac{(\frac{1}{4} F \ell) \cdot \frac{1}{2} h}{\frac{1}{12} b h^3} = \frac{3}{2} \frac{F \ell}{b h}$$

$$\tau_{\text{max}} = \frac{V_{\text{max}} S_z^{\text{a}}}{b I_{zz}} = \frac{\frac{1}{2} F \cdot (\frac{1}{8} b h^2)}{b \cdot \frac{1}{12} b h^3} = \frac{3}{4} \frac{F}{b h}$$

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