Problem 7.12 Torsional stiffness of a semi-circular section

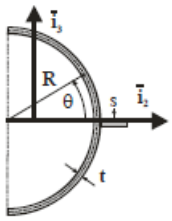


Figure 7.33 depicts the thin-walled, semi-circular open cross-section of a bema. The wall thickness is t, and the material Young's and shear moduli are E and G, respectively. (1) Find the torsional stiffness of the section. (2) Find the distribution of shear stress due to an applied torque Q. (3) Indicate the location and magnitude of the maximum shear stress, $Rt^2\tau_{max}/Q$

Problem 8.2. Thin-walled "Z" shaped cross-section beam

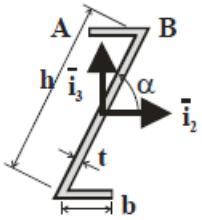


Figure 8.12 shows the cross-section of a thin-walled, "Z" shaped beam skewed at an angle α with respect to axis i_2. (1) Find the centroidal bending stiffness. (2) For $M_2 = M_o$ and $M_3 = 0$, find the neutral axis orientation with respect to axis i_2. (3) Determine the location and magnitude of the maximum axial stress. Use b = h/2 and sin α = 4/5.

Problem 8.4. Thin-walled "L" shaped cross-section beam

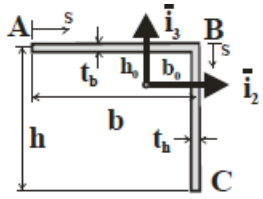
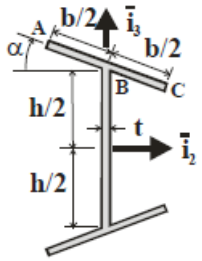


Figure 8.14 shows a thin-walled beam with an "L" shaped cross-section. The cantilevered beam is of length L = 48 in and carries a tip load, P = 200 lbs, applied along axis i_3. (1) Determine the location of the centroid. (2) Find the centroidal bending stiffness. (3) Determine the orientation of the neutral axis. (4) Determine the axial stress distribution over the cross-section. Find the location and magnitude of the maximum axial stress. Use b = h = 2.0 in, $t_b = t_h = 0.100$ in and E= $10.6 \cdot 10^6$ psi

Problem 8.8. Skewed "I" shaped cross-section



A cantilevered beam of length L is constructed with the thin-walled, skewed "I" shaped cross-section shown in fig. 8.18. The wall thickness for both flanges and web is a constant, t. Axis i_2 is an axis of symmetry of the section. A concentrated load, P, is applied at the tip of the beam and acts along axis i3. (1) Determine the location of the centroid. (2) Find the centroidal bending stiffness. (3) Determine the axial stress acting in the root section at points **A**, **B**, and **C**.