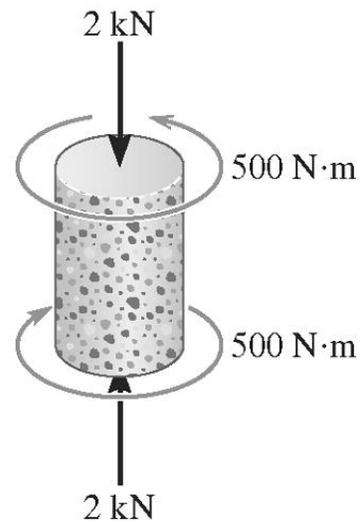
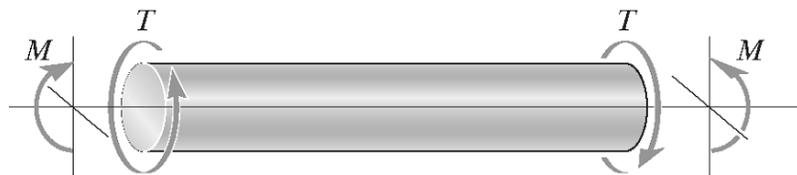


1. The short concrete cylinder having a diameter of 50 mm is subjected to a torque of 500 N · m and an axial compressive force of 2 kN. Determine if it fails according to the maximum normal stress theory. The ultimate stress of the concrete is 28 MPa.



2. If a solid shaft having a diameter d is subjected to a torque T and moment M , show that by the maximum normal stress theory the maximum allowable principal stress is

$$[\sigma] = (16/\pi d^3) (M + \sqrt{M^2 + T^2})$$



Name:

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AM27: Strength Theory

3. A material is subjected to plane stress. (a) Express the distortion energy theory of failure in terms of σ_x , σ_y , and τ_{xy} . (b) Express the maximum shear stress theory of failure in terms of σ_x , σ_y , and τ_{xy} . Assume that the principal stresses are of different algebraic signs.

4. The components of plane stress at a critical point on a structural steel shell are shown. Determine if failure (yielding) has occurred on the basis of the maximum shear stress theory and maximum distortion energy theory, respectively. $\sigma_Y = 250$ MPa.

