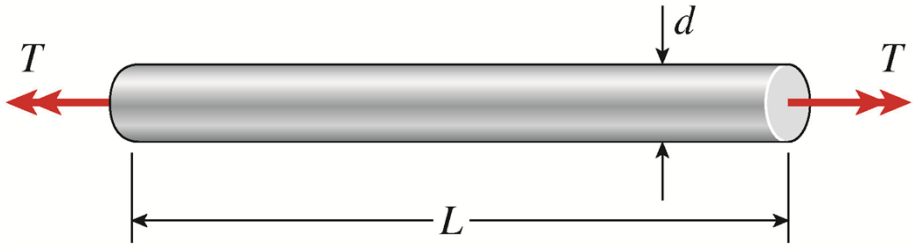
作業7、 11/15習題

- 3.2-2 、 3.2-4
- 3.3-9 、 3.3-15

- 11月22日 上課前繳交

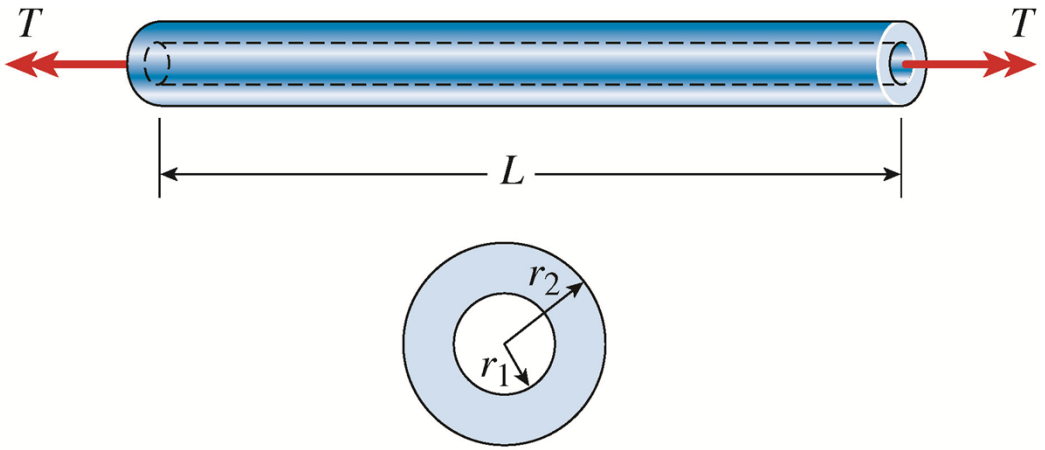
3.2-2

- A plastic bar of diameter d =56 mm is to be twisted by torques T (see figure) until the angle of rotation between the ends of the bar is 4.0°. If the allowable shear strain in the plastic is 0.012 rad, what is the minimum permissible length of the bar?



3.2-4

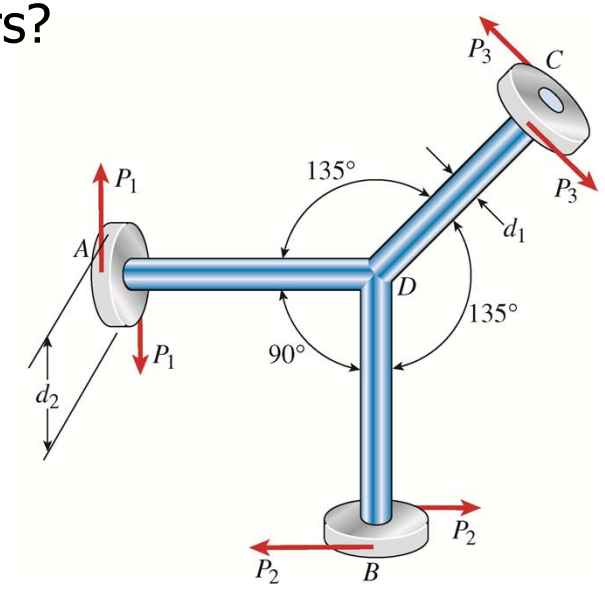
- A circular steel tube of length L=1.0 m is loaded in torsion by torques T (see figure).
  (a) If the inner radius of the tube is r_1=45 mm and the measured angle of twist between the ends is 0.5°, what is the shear strain γ_1 (in radians) at the inner surface?
  (b) If the maximum allowable shear strain is 0.0004 rad and the angle of twist is to be kept at 0.45° by adjusting the torque T, what is the maximum permissible outer radius $(r_2)_{max}$?



3.3-9

- Three identical circular disks *A*, *B*, and *C* are welded to the ends of three identical solid circular bars (see figure). The bars lie in a common plane and the disks lie in planes perpendicular to the axes of the bars. The bars are welded at their intersection *D* to form a rigid connection. Each bar has diameter d_1=10 mm and each disk has diameter d_2=75 mm

  Forces P_1, P_2, and P_3 act on disks *A*, *B*, and *C*, respectively, thus subjecting the bars to torsion. If P_1=100 N, what is the maximum shear stress τ_{max} in any of the three bars?



3.3-15

- A solid brass bar of diameter d=30 mm is subjected to torques T_1, as shown in part (a) of the figure. The allowable shear stress in the brass is 80 MPa
- (a) What is the maximum permissible value of the torques T_1?
- (b) If a hole of diameter 15 mm is drilled longitudinally through the bar, as shown in part (b) of the figure, what is the maximum permissible value of the torques T_2?
- (c) What is the percent decrease in torque and the percent decrease in weight due to the hole?