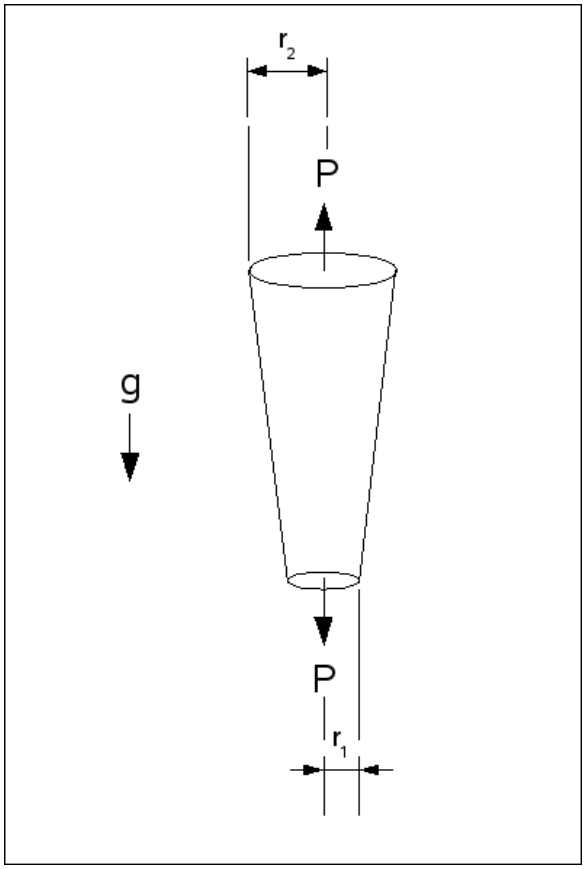
Strength of Materials
HW#2
Due: Friday February 6, 2009 by class-time

SP 2.1
The rod has a slight taper and length *L*. It is suspended from the ceiling and supports its own weight and a load at the end *P*. Determine the displacement of its end due to both of these loads. The material has a specific weight (weight/volume) γ, and a modulus of elasticity *E*.



2.8
An 80-m-long wire of 5-mm diameter is made of a steel with *E* = 200 GPa and an ultimate tensile strength of 400 MPa. If a factor of safety of 3.2 is desired, determine *(a)* the largest allowable tension in the wire, *(b)* the corresponding elongation of the wire.

2.19

Both portions of the rod *ABC* are made of an aluminum for which *E* = 70 GPa. Knowing that the magnitude of **P** is 4 kN, determine (a) the value of **Q** so that the deflection at A is zero, *(b)* the corresponding deflection of ***B.***
Fig. P2.19 and P2.20

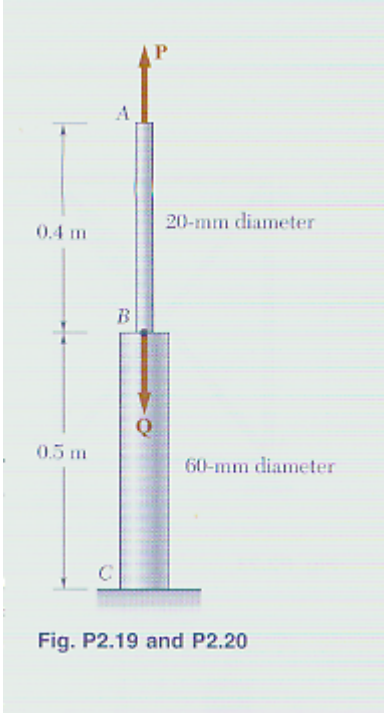


Fig. P2.19 and P2.20

2.24

For the structure in Prob. 2.23, determine *(a)* the distance *h so* that the deformations in members *AB, BC, CD,* and *AD* are equal to 0.04 in., *(b)* the corresponding tension in member AC.

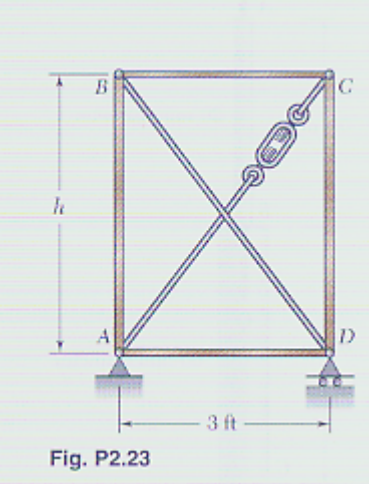


Fig. P2.23

2.26

Each of the links *AB* and CD is made of steel (E = 29 X 10^6 psi) and has a uniform rectangular cross section of 1/4 x 1 in. Determine the largest load which can be suspended from point *E* if the deflection of *E* is not to exceed 0.01 in.

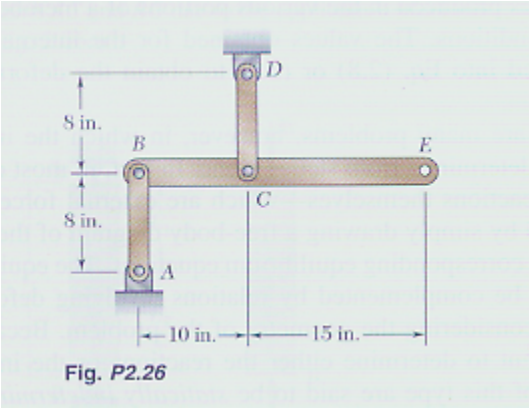


Fig. *P2.26*

2.35

Compressive centric forces of 40 kips are applied at both ends of the assembly shown by means of rigid plates. Knowing that E_s = 29 X 10^6 psi and E_a = 10.1 X 10^6 psi, determine *(a)* the normal stresses in the steel core and the aluminum shell, *(b)* the deformation of the assembly.

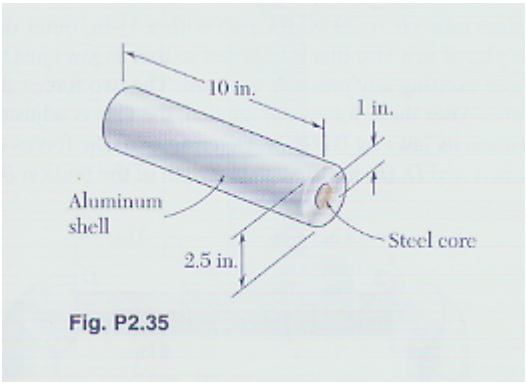


Fig. P2.35

2.37

The 1.5-m concrete post is reinforced with six steel bars, each with a 28-mm diameter. Knowing that E_s = 200 GPa and E_c = 25 GPa, determine the normal stresses in the steel and in the concrete when a 1550-kN axial centric force **P** is applied to the post.

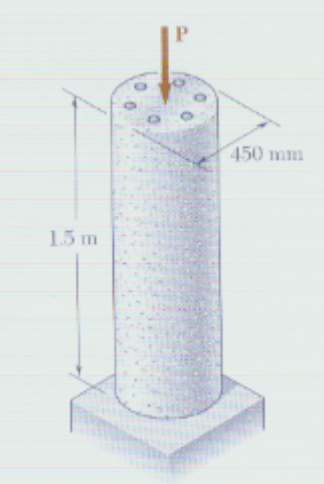


Fig. P2.37