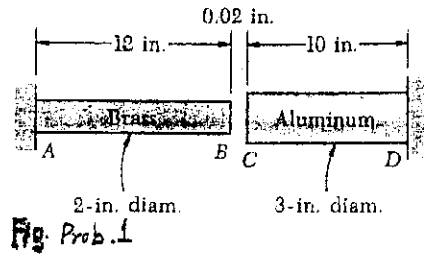


本試題是否可以使用計算機: 可使用, 不可使用 (請命題老師勾選)

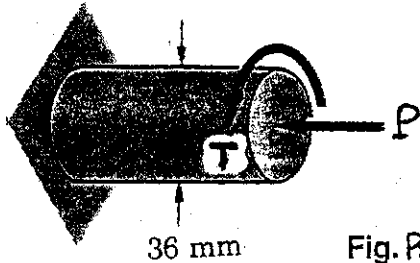
Prob. 1. Rod AB is made of brass ($E_b = 15 \times 10^6$ psi, $\alpha_b = 11.6 \times 10^{-6}/^\circ\text{F}$) and rod CD of aluminum ($E_a = 10.1 \times 10^6$ psi, $\alpha_a = 13.1 \times 10^{-6}/^\circ\text{F}$). Knowing that at 60°F a 0.02-in. gap exists between the ends of the two rods, determine (a) the normal stress in each rod after the temperature has been raised to 180°F , (b) the deformation of rod AB at that time.

(25分)



Prob. 2. A 36-mm-diameter shaft is made of a grade of steel with a 250-MPa tensile yield strength. Using the maximum-shearing-stress criterion, determine the magnitude of the torque T at which yield first occurs when $P = 200$ kN.

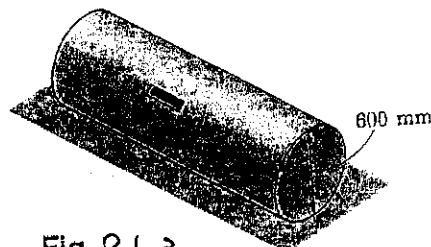
(25分)



Prob. 3. A strain gage is attached horizontally to the cylindrical surface of a pressure vessel of 600-mm outside diameter and 7.50-mm wall thickness. Knowing that $E = 200$ GPa and $\nu = 0.25$ and that the strain gage reads 120μ , determine the gage pressure inside the vessel.

(Hint) The Hookes' Law under Biaxial stress state must be used.

(25分)

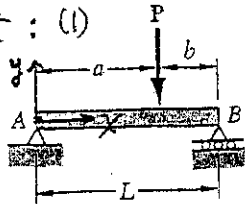


(背面仍有題目,請繼續作答)

本試題是否可以使用計算機： 可使用， 不可使用（請命題老師勾選）

Prob. 4. The simply supported beam AB is struck squarely at D by a block of mass m moving horizontally with a velocity v_0 . Show that the resulting maximum normal stress σ_m in the beam due to bending is independent of the location of point D .

Hint: (1)



For $x \leq a$:

$$y = \frac{Pb}{6EIL} [x^3 - (L^2 - b^2)x]$$

(2) Strain Energy in Beam $U = \frac{1}{2} P \delta x$

(3) Neglect the Inertia Effect of Impact, Using the Concept of Equivalent Static Load.

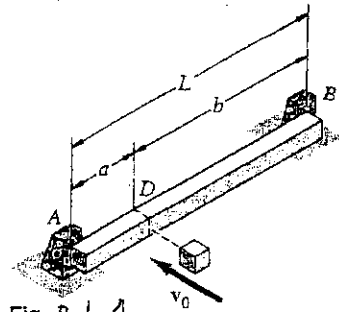


Fig. Prob. 4.

(25分)