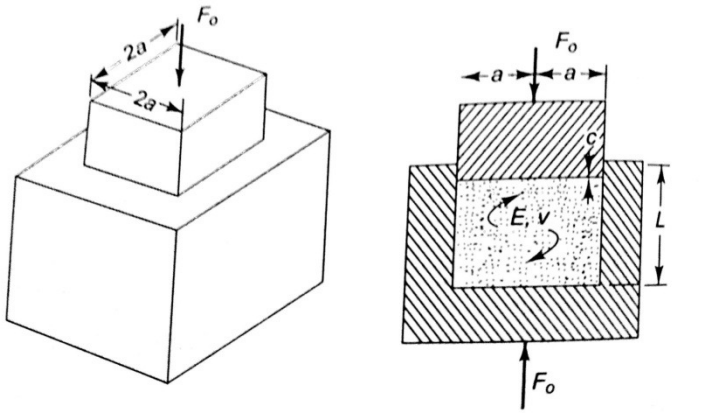
1. An elastic material with modulus of elasticity E and Poisson's ratio v originally fills a square cavity of sides 2a and height L in a rigid block. A rigid cap is placed on top of the elastic material, and when there is a force F_o acting on the cap the height of the elastic material is observed to have decreased by an amount c. Calculate the magnitude of the force F_o.



$$F_o = \frac{(1-\vartheta)4Eca^2}{(1-\vartheta)(1-2\vartheta)L}$$

2. The stresses in a flat steel plate in a condition of plane stress are

σ_x = 130 MPa, σ_y = -70 MPa, τ_{xy} = 80 MPa, σ_z = 0

v = 0.3 , E = 205 GPa

   Find the strain in x direction

3. In question 2, Find the strain in y direction
4. In question 2, Find the strain in y direction
5. In question 2, Find the shear strain
6. In question 2 find the major principal strain
7. In question 2, find the minor principal strain

8. It is proposed to check the safety of a thin walled ,cylindrical pressure vessel made of hot rolled low carbon steel by measuring changes in length and circumference as the internal pressure is increased. How much change in length would occur if the material yielded. The material yields at 250 MPa. Use Maximum shear stress criteria and relationship

   $\sigma\theta = pr/t$; $\sigma z = \sigma\theta/2$; $\sigma r = 0$.

9. It is proposed to check the safety of a thin walled ,cylindrical pressure vessel made of hot rolled low carbon steel by measuring changes in length and circumference as the internal pressure is increased. How much change in circumference would occur if the material yielded. The material yields at 250 MPa. Use Maximum shear stress criteria and relationship

   $\sigma\theta = pr/t$; $\sigma z = \sigma\theta/2$; $\sigma r = 0$.