

Homework 1

1.4. If a displacement field is described by

$$u = (-x^2 + 2y^2 + 6xy)10^{-4}$$

$$v = (3x + 6y - y^2)10^{-4}$$

determine $\varepsilon_x, \varepsilon_y, \gamma_{xy}$ at the point $x = 1, y = 0$.

1.8. In a solid body, the six components of the stress at a point are given by $\sigma_x = 40$ MPa, $\sigma_y = 20$ MPa, $\sigma_z = 30$ MPa, $\tau_{yz} = -30$ MPa, $\tau_{xz} = 15$ MPa, and $\tau_{xy} = 10$ MPa. Determine the normal stress at the point, on a plane for which the normal is $(n_x, n_y, n_z) = (\frac{1}{2}, \frac{1}{2}, 1/\sqrt{2})$. (Hint: Note that normal stress $\sigma_n = T_x n_x + T_y n_y + T_z n_z$.)