

UCL Mechanical Engineering 2021/2022

MECH0026 Problem Sheet 1 Solutions

HD

October 11, 2021

1

1.1

For plane stress, our assumption is that our stress tensors relating to the z -direction are 0. For plane strain, our assumption is that there is no displacement in the z -direction.

2

$$\phi = \frac{P}{20h^3} (15h^2x^2y - 5x^2y^3 - 2h^2y^3 + y^5) \quad (2.1)$$

$$\sigma_x = \frac{\partial^2 \phi}{\partial y^2} = \frac{P}{20h^3} (20y^3 - 30x^2y - 12h^2y) \quad (2.2)$$

$$\sigma_y = \frac{\partial^2 \phi}{\partial x^2} = \frac{P}{20h^3} (30h^2xy - 10xy^3) \quad (2.3)$$

$$\tau_{xy} = -\frac{\partial^2 \phi}{\partial x \partial y} = -\frac{P}{20h^3} (20h^2x - 30xy^2) \quad (2.4)$$