

1 Exercise V-7

Given is the displacement field:

$$u_1 = x_1 x_3, u_2 = -x_1 x_2, \text{ and } u_3 = x_1^2 - x_3^2$$

and material properties $E = 2$ (discuss the units, but drop them in calculations to save space) and $\nu = 0.25$.

Questions:

- Compute the stress tensor (components).
- In the point $(x_1, x_2, x_3) = (0, 0, z_0)$ compute the eigen-stresses and maximum shear stress.

2 Exercise V-8

In a homogenous body that is made of a linear elastic, isotropic material, the displacement field is given as:

$$u_1 = \frac{p}{E} a \left[\frac{x_2}{a} + 2 \frac{x_1 x_2}{a^2} - \frac{x_2^2}{a^2} \right]$$

$$u_2 = \frac{p}{E} a \left[\frac{x_1}{a} + \alpha \frac{x_1^2}{a^2} + \beta \frac{x_1 x_2}{a^2} - 2 \frac{x_2^2}{a^2} \right]$$

$$u_3 = 0$$

with coordinates x_1 and x_2 , and variables p, E, a with $\nu = 0.25$

Questions:

In absence of volume forces, compute the magnitude of the parameters α and β using the information that the stress field is in mechanical equilibrium.