

UE204: Assignment 5

Due: 14/3/16

1. Problem 5.9
2. Problem 5.10
3. Problem 5.14
4. Problem 5.21 (Hint: Assume frictionless contact. Is there a constraint on $\epsilon_{\theta\theta}$?)
5. Problem 5.37. Assume that the diameter of the shaft does not change. Use the following expressions for the radial displacement u_r and stresses τ_{rr} and $\tau_{\theta\theta}$ when pressures p_i and p_o are applied at the inner and outer radii a and b , respectively:

$$u_r = \frac{1}{E \left(1 - \frac{a^2}{b^2}\right)} \left[(1 - \nu) \left[p_i \frac{a^2}{b^2} - p_o \right] r + (1 + \nu) \frac{a^2}{r} (p_i - p_o) \right],$$
$$\tau_{rr} = - \frac{p_i \left[\frac{b^2}{r^2} - 1 \right] + p_o \left[\frac{b^2}{a^2} - \frac{b^2}{r^2} \right]}{\frac{b^2}{a^2} - 1},$$
$$\tau_{\theta\theta} = - \frac{p_i \left[\frac{b^2}{r^2} + 1 \right] + p_o \left[\frac{b^2}{a^2} + \frac{b^2}{r^2} \right]}{\frac{b^2}{a^2} - 1}.$$