

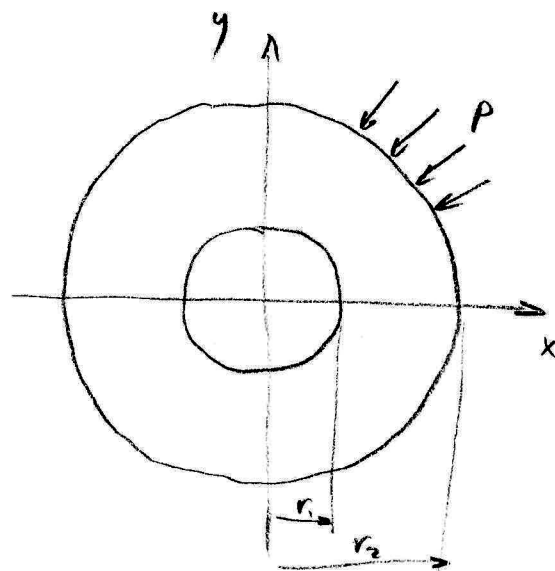
$$p = 40 \text{ MPa}, r_1 = 20 \text{ mm}, r_2 = 50 \text{ mm}, E = 2.1 \cdot 10^5 \text{ MPa}, \mu = 0.3, \sigma_k = 300 \text{ MPa}$$

1. Odvojite podmunicu

$$\sigma_r = 0 \text{ pri } r = r_1$$

$$\sigma_r = -p \text{ pri } r = r_2$$

$$\sigma_z = 0 \text{ (rovinna napjatost)}$$



2. Stanovici A, B

$$A - \frac{B}{r_1^2} = 0$$

$$A - \frac{B}{r_2^2} = -p$$

$$-\frac{B}{r_1^2} + \frac{B}{r_2^2} = p \Rightarrow B = \frac{p}{-\frac{1}{r_1^2} + \frac{1}{r_2^2}} \Rightarrow B = \frac{p r_1^2 r_2^2}{r_1^2 - r_2^2} = \frac{40 \cdot 20^2 \cdot 50^2}{20^2 - 50^2}$$

$$B = -19048 \text{ MPa}$$

$$A = \frac{B}{r_1^2} = \frac{-19048}{20^2} = -48 \text{ MPa} \cdot \text{mm}^{-2}$$

3. Rešeni

(i) bezpečnost k HS pružnosti

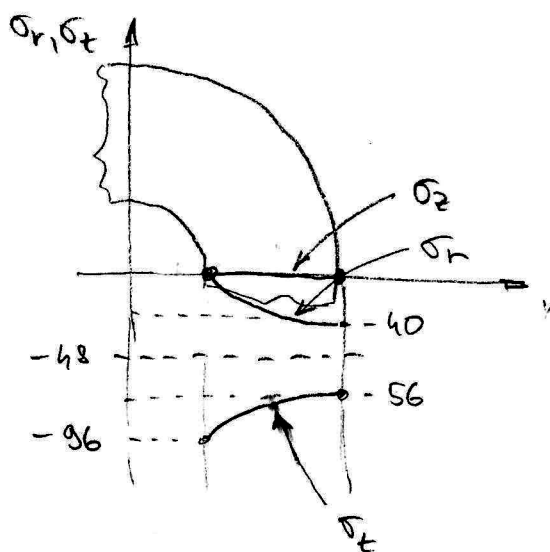
$$\sigma_r = -48 + \frac{19048}{r^2}$$

$$\sigma_t = -48 - \frac{19048}{r^2}$$

$$\sigma_z = 0$$

$$\sigma_{\text{ed}} = |\sigma_t - \sigma_r|_{r=r_1} =$$

$$= |\sigma_t - \sigma_r|_{r=r_1} = |-96| = 96 \text{ MPa}$$



$$k = \frac{\sigma_k}{\sigma_{\text{ed}}} = \frac{300}{96} = \underline{3.1}$$

(ii) posumiť $u(r=r_1)$

$$u = \frac{(1+\mu)(1-2\mu)}{E} \cdot A \cdot r + \frac{1+\mu}{E} \cdot \frac{B}{r} = \frac{(1+0.3)(1-2 \cdot 0.3)}{2.1 \cdot 10^5} \cdot (-48) \cdot r + \\ + \frac{1+0.3}{2.1 \cdot 10^5} \cdot \frac{-19048}{r} = -1.19 \cdot 10^{-4} r - 1.18 \cdot 10^{-1} \frac{1}{r}$$

$$u(r=r_1) = -1.19 \cdot 10^{-4} \cdot 20 - 1.18 \cdot 10^{-1} \frac{1}{20} = \underline{\underline{-8.28 \cdot 10^{-3} \text{ mm}}}$$