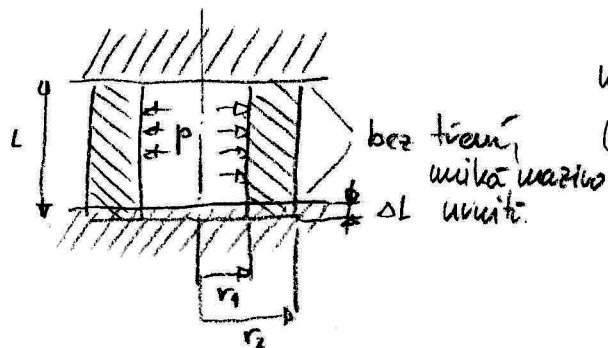


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material: E, ν, σ_k

Účele bezpečnost k MS a zmešm tiam.

okrajové podmínky: $\sigma_r|_{r=r_2} = 0$

$$\sigma_r|_{r=r_1} = -p$$

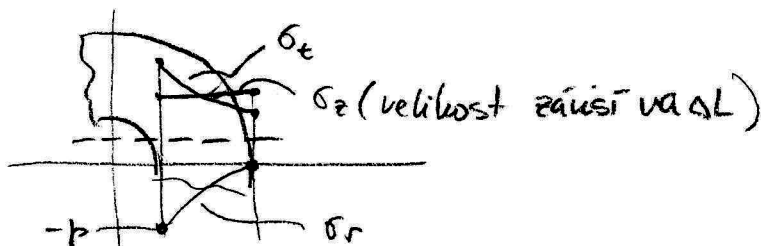
$$w = \Delta L$$

$$\sigma_n = A' - \frac{B}{r^2} \Rightarrow A' - \frac{B}{r_1^2} = -p, A' - \frac{B}{r_2^2} = 0 \Rightarrow \text{viz. dnylý příklad} \Rightarrow$$

$$\Rightarrow A' = -\frac{p r_1^2}{r_1^2 - r_2^2}, B = -\frac{p r_1^2 r_2^2}{r_1^2 - r_2^2}$$

$$\sigma_r = -\frac{p r_1^2}{r_1^2 - r_2^2} \left(1 - \frac{r_2^2}{r^2}\right)$$

$$\sigma_t = -\frac{p r_1^2}{r_1^2 - r_2^2} \left(1 + \frac{r_2^2}{r^2}\right)$$



$$\sigma_z = 2\nu A' + \frac{E(1-\nu+2\nu^2)}{(1+\nu)(1-2\nu)} \cdot \frac{\Delta L}{L} = 2\nu \left(-\frac{p r_1^2}{r_1^2 - r_2^2}\right) + \frac{E(1-\nu+2\nu^2)}{(1+\nu)(1-2\nu)} \cdot \frac{\Delta L}{L}$$

$$\sigma_{\text{red}}^{\text{max}} = \max \left\{ |\sigma_r - \sigma_t|_{r=r_1}, |\sigma_r - \sigma_z|_{r=r_1} \right\} \Rightarrow k = \frac{\sigma_k}{\sigma_{\text{red}}^{\text{max}}}$$

$$u = \left(\frac{(1+\nu)(1-2\nu)}{E} \cdot \left(-\frac{p r_1^2}{r_1^2 - r_2^2} \right) - \nu \frac{\Delta L}{L} \right) \cdot r + \frac{1+\nu}{E} \cdot \left(-\frac{p r_1^2 r_2^2}{r_1^2 - r_2^2} \right) \cdot \frac{1}{r}$$

$$u(r=r_1) = \left[-\frac{(1+\nu)(1-2\nu)}{E} \frac{p r_1^2}{r_1^2 - r_2^2} - \nu \frac{\Delta L}{L} \right] \cdot r_1 - \frac{1+\nu}{E} \frac{p r_1^2 r_2^2}{r_1^2 - r_2^2}$$

$$u(r=r_2) = \left[-\frac{(1+\nu)(1-2\nu)}{E} \frac{p r_1^2}{r_1^2 - r_2^2} - \nu \frac{\Delta L}{L} \right] r_2 - \frac{1+\nu}{E} \frac{p r_1^2 r_2^2}{r_1^2 - r_2^2}$$