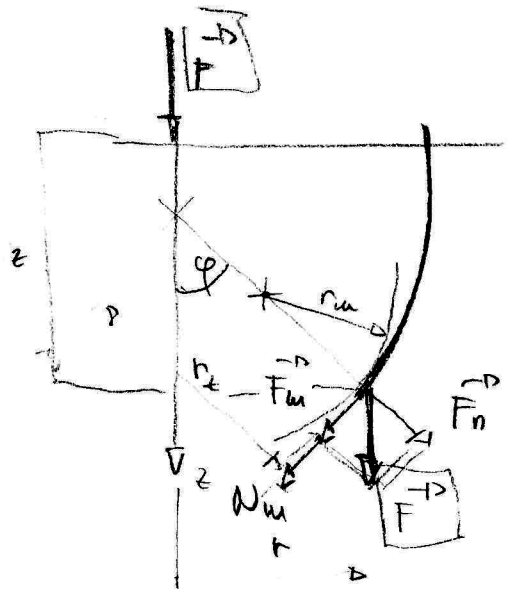
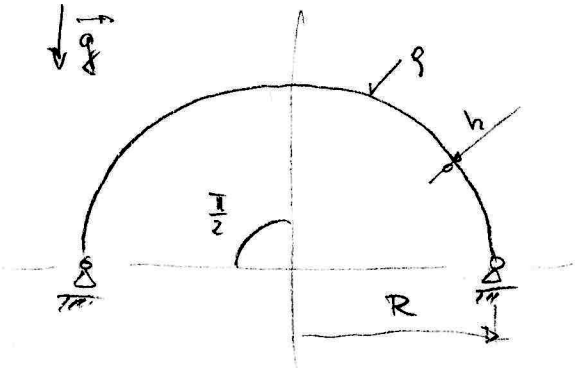
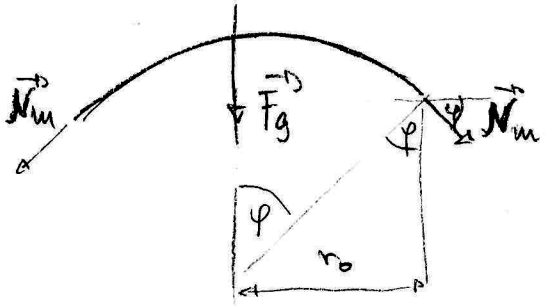


$$2\pi r N_m \sin\varphi + F = 0$$

$$\frac{N_m}{r_m} + \frac{N_t}{r_t} = \frac{F_n}{S}$$

Př: Proveďte napjatostní analýzu u beznámentové skořepiny podle obr.





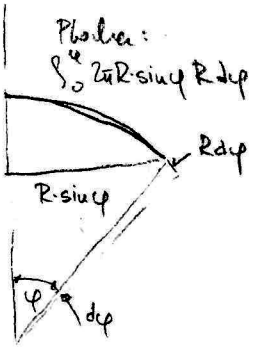
1. Tíhová síla

$r_0 = R\cdot\sin\varphi$

$$F_g = h\rho g \int_0^{\varphi} 2\pi R^2 \sin\varphi' d\varphi' =$$

$$= 2\pi h\rho g R^2 \left[-\cos\varphi'\right]_0^{\varphi} =$$

$$= 2\pi h\rho g R^2 \left[-\cos\varphi + 1\right]$$



2. Rovnováha v ose z:

$$2\pi r_0 \cdot \sin\varphi N_m + F_g = 0$$

$$N_m 2\pi R\cdot\sin^2\varphi + 2\pi h\rho g R^2 (1-\cos\varphi) = 0$$

$$N_m = -\frac{2\pi h\rho g R^2 (1-\cos\varphi)}{2\pi R\cdot\sin^2\varphi} = -\frac{h\rho g R(1-\cos\varphi)}{\sin^2\varphi}$$

3. Laplaceova rovnice

$$\frac{N_m}{r_m} + \frac{N_t}{r_t} = \frac{F_n}{S}$$

$$F_n = -F_g\cos\varphi = -2\pi h\rho g R^2\left[-\cos^2\varphi + \cos\varphi\right], \quad S = 2\pi\cdot R^2 (1-\cos\varphi)$$

$r_m = r_t = R$

$$-\frac{h\rho g R(1-\cos\varphi)}{\sin^2\varphi} + \frac{N_t}{R} = -\frac{h\rho g R^2 \cos\varphi\,(1-\cos\varphi)}{R^2(1-\cos\varphi)}$$

$$-\frac{h\rho g(1-\cos\varphi)}{\sin^2\varphi} + \frac{N_t}{R} = -h\rho g\cos\varphi \quad \Rightarrow \quad N_t = R\left[-h\rho g\cos\varphi - \frac{h\rho g(1-\cos\varphi)}{\sin^2\varphi}\right]$$

$$\sigma_m = \frac{N_m}{h} \quad , \quad \sigma_t = \frac{N_t}{h}$$