

Resultate Baustatik I, Hausübung 5

1a) $\sigma_1 = 30 \text{ N/mm}^2$
 $\sigma_2 = -30 \text{ N/mm}^2$
 $\varphi_1 = 135^\circ$

1b) $\sigma_1 = \sigma_2 = -30 \text{ N/mm}^2$
 $\varphi_1 = 0^\circ$

1c) $\sigma_1 = 22.4 \text{ N/mm}^2$
 $\sigma_2 = -22.4 \text{ N/mm}^2$
 $\varphi_1 = 13.3^\circ$

2a) Schnitt a-a

$\sigma_{x_{a-a}} = 8 \text{ N/mm}^2$

2b) Schnitt b-b

($\alpha = 28^\circ$: geg.)

$\sigma_{n_{b-b}} = 6.2 \text{ N/mm}^2$

$\tau_{t_{n_{b-b}}} = 3.3 \text{ N/mm}^2$

2c) Schnitt c-c

($\sigma_{n_{c-c}} = 1 \text{ N/mm}^2$: geg.)

$\tau_{t_{n_{c-c}}} = \pm 2.65 \text{ N/mm}^2$

$69.3^\circ \leq \beta \leq 110.7^\circ$

3) $\epsilon_x = 0$

$\epsilon_y = \frac{\delta}{a} \cdot \frac{\sqrt{3}}{2} = 0.866 \frac{\delta}{a}$

$\gamma_{xy} = \frac{\delta}{a} \cdot \frac{1}{2} = 0.5 \frac{\delta}{a}$

$\tan 2\varphi = -\frac{1}{\sqrt{3}} \rightarrow \varphi_1 = 75^\circ$

$\epsilon_1 = \frac{\delta}{a} \cdot \frac{\sqrt{3}+2}{4} = 0.933 \frac{\delta}{a}$

$\epsilon_2 = \frac{\delta}{a} \cdot \frac{\sqrt{3}-2}{4} = -0.067 \frac{\delta}{a}$

$M = \frac{\delta}{a} \frac{\sqrt{3}}{4}$

$R = \frac{\delta}{a} \cdot \frac{1}{2}$

4a) $A = 2.40 \cdot 10^6 \text{ mm}^2$

$I_y = 2.592 \cdot 10^{12} \text{ mm}^4$

$I_z = 1.184 \cdot 10^{12} \text{ mm}^4$

$i_y^2 = 1.080 \cdot 10^6 \text{ mm}^2$

$i_z^2 = 0.493 \cdot 10^6 \text{ mm}^2$

4b) Kern: n-n am oberen Rand $\rightarrow z_{A1} = 771 \text{ mm}$

n-n am unteren Rand $\rightarrow z_{A2} = -771 \text{ mm}$

n-n am linken Rand $\rightarrow z_{A3} = 493 \text{ mm}$

n-n am rechten Rand $\rightarrow z_{A4} = -493 \text{ mm}$

4c) $z = 0.8757y - 540$ (y und z in [mm])

4d) Punkt A: $\sigma_{max}^+ = 6.70 \text{ N/mm}^2$

Punkt C: $\sigma_{max}^- = 10.86 \text{ N/mm}^2$