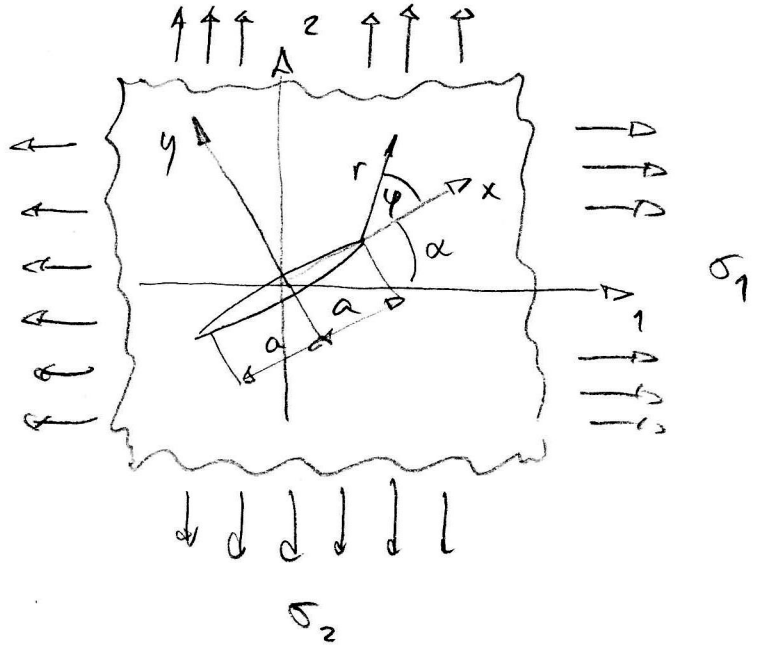
Př: U trhliny v bloku materiálu zatíženého hlavními napětími σ_1 a σ_2 popište napětí před jejími čely.



$\sigma_1 = 10\ MPa,\ \sigma_2 = 2\ MPa,\ a = 5\cdot10^{-3}\ mm,\ \alpha = 25°$

$$T_\sigma^{25} = \begin{bmatrix} \cos25° & -\sin25° \\ \sin25° & \cos25° \end{bmatrix}^T \begin{bmatrix} \sigma_1 & 0 \\ 0 & \sigma_2 \end{bmatrix} \begin{bmatrix} \cos25° & -\sin25° \\ \sin25° & \cos25° \end{bmatrix} =$$

$$= \begin{bmatrix} \cos25 & \sin25° \\ -\sin25° & \cos25° \end{bmatrix} \begin{bmatrix} \sigma_1\cos25° & -\sigma_1\sin25° \\ \sigma_2\sin25° & \sigma_2\cos25° \end{bmatrix} =$$

$$= \begin{bmatrix} \sigma_1\cos^2 25° + \sigma_2\sin^2 25° & -\sigma_1\cos25°\sin25° + \sigma_2\cos^2 25°\sin25° \\ -\sigma_1\cos25°\sin25° + \sigma_2\cos25°\sin25° & \sigma_1\sin^2 25° + \sigma_2\cos^2 25° \end{bmatrix}$$

$$k_I = \sigma_{yy}\sqrt{\pi\cdot a} = (\sigma_1\sin^2 25° + \sigma_2\cos^2 25°)\sqrt{\pi\cdot a}\ ,\quad k_{II} = \tau_{xy}\sqrt{\pi\cdot a} = (-\sigma_1\cos25°\sin25° + \sigma_2\cos^2 25°\sin25°)\sqrt{\pi\cdot a}$$

$$k_I = (10\cdot\sin^2 25° + 2\cos^2 25°)\sqrt{\pi\cdot 5\,10^{-3}} = 0.43\ MPa\cdot mm^{\frac{1}{2}}$$

$$k_{II} = (-10\cos25°\sin25° + 2\cos25°\sin25°)\cdot\sqrt{\pi\cdot 5\cdot10^{-3}} = -0.38\ MPa\cdot mm^{\frac{1}{2}}$$

Podle T10 na str 188 skript PPII:

$$\sigma_x = \frac{k_I}{\sqrt{2\pi r}}\cdot\cos\frac{\varphi}{2}\left[1-\sin\frac{\varphi}{2}\sin\frac{3\varphi}{2}\right] - \frac{k_{II}}{\sqrt{2\pi r}}\sin\frac{\varphi}{2}\left[2+\cos\frac{\varphi}{2}\cos\frac{3\varphi}{2}\right] = \frac{0.43}{\sqrt{2\pi r}}\cos\frac{\varphi}{2}\left[1-\sin\frac{\varphi}{2}\sin\frac{3}{2}\varphi\right] + \frac{0.38}{\sqrt{2\pi r}}\sin\frac{\varphi}{2}\left[2+\cos\frac{\varphi}{2}\cos\frac{3\varphi}{2}\right]$$

$$\sigma_y = \frac{k_I}{\sqrt{2\pi r}}\cdot\cos\frac{\varphi}{2}\left[1+\sin\frac{\varphi}{2}\sin\frac{3}{2}\varphi\right] + \frac{k_{II}}{\sqrt{2\pi r}}\sin\frac{\varphi}{2}\cos\frac{\varphi}{2}\cos\frac{3\varphi}{2} = \frac{0.43}{\sqrt{2\pi r}}\cos\frac{\varphi}{2}\left[1+\sin\frac{\varphi}{2}\sin\frac{3}{2}\varphi\right] - \frac{0.38}{\sqrt{2\pi r}}\sin\frac{\varphi}{2}\cos\frac{\varphi}{2}\cos\frac{3\varphi}{2}$$

$$\tau_{xy} = \frac{k_I}{\sqrt{2\pi r}}\cdot\sin\frac{\varphi}{2}\cos\frac{\varphi}{2}\cos\frac{3\varphi}{2} + \frac{k_{II}}{\sqrt{2\pi r}}\cos\frac{\varphi}{2}\left[1-\sin\frac{\varphi}{2}\sin\frac{3}{2}\varphi\right] = \frac{0.43}{\sqrt{2\pi r}}\sin\frac{\varphi}{2}\cos\frac{\varphi}{2}\cos\frac{3\varphi}{2} - \frac{0.38}{\sqrt{2\pi r}}\cos\frac{\varphi}{2}\left[1-\sin\frac{\varphi}{2}\sin\frac{3}{2}\varphi\right]$$