Appendix

$$\sigma = \frac{P}{A_0}\cos^2\theta \quad \tau = \frac{P}{A_0}\sin\theta\cos\theta$$

$$\delta = \frac{PL}{AE}$$

$$\delta = \sum_i \frac{P_i L_i}{A_i E_i}$$

$$\delta_T = \alpha(\Delta T)L$$

$\alpha =$ thermal expansion coef.

$$\sigma = -E\alpha(\Delta T)$$

$$\varepsilon_x = +\frac{\sigma_x}{E} - \frac{\nu\sigma_y}{E} - \frac{\nu\sigma_z}{E}$$

$$\varepsilon_y = -\frac{\nu\sigma_x}{E} + \frac{\sigma_y}{E} - \frac{\nu\sigma_z}{E}$$

$$\varepsilon_z = -\frac{\nu\sigma_x}{E} - \frac{\nu\sigma_y}{E} + \frac{\sigma_z}{E}$$

$$\tau_{\max} = \frac{Tc}{J} \quad \text{and} \quad \tau = \frac{T\rho}{J}$$

$$J = \tfrac{1}{2}\pi c^4 \qquad J = \tfrac{1}{2}\pi\left(c_2^4 - c_1^4\right)$$

$$L\gamma = \rho\phi \quad \text{or} \quad \gamma = \frac{\rho\phi}{L}$$

$$\frac{E}{2G} = (1+\nu)$$

$$\phi = \frac{TL}{JG} \qquad \phi = \sum_i \frac{T_i L_i}{J_i G_i}$$

$$\sigma_x = \frac{My}{I}$$

$$\sigma_{x'} = \frac{\sigma_x + \sigma_y}{2} + \frac{\sigma_x - \sigma_y}{2}\cos 2\theta + \tau_{xy}\sin 2\theta$$

$$\sigma_{y'} - \frac{\sigma_x + \sigma_y}{2} - \frac{\sigma_x - \sigma_y}{2}\cos 2\theta - \tau_{xy}\sin 2\theta$$

$$q = \frac{VQ}{I} = shear\ \ flow$$

$$\tau_{x'y'} = -\frac{\sigma_x - \sigma_y}{2}\sin 2\theta + \tau_{xy}\cos 2\theta$$

$$\tau_{ave} = \frac{VQ}{It}$$

$$\tau_{\max} = \frac{|\sigma_a - \sigma_b|}{2} < \frac{\sigma_Y}{2}$$

$$\sigma_{\max,\min} = \frac{\sigma_x + \sigma_y}{2} \pm \sqrt{\left(\frac{\sigma_x - \sigma_y}{2}\right)^2 + \tau_{xy}^2}$$

$$\sigma_a^2 - \sigma_a\sigma_b + \sigma_b^2 < \sigma_Y^2$$

$$\tan 2\theta_p = \frac{2\tau_{xy}}{\sigma_x - \sigma_y}$$

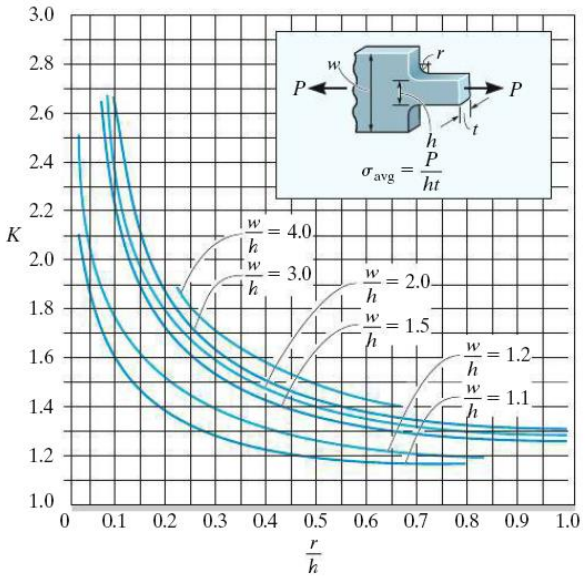
$$\sigma_1 = \frac{pr}{t} \qquad \sigma_2 = \frac{pr}{2t}$$

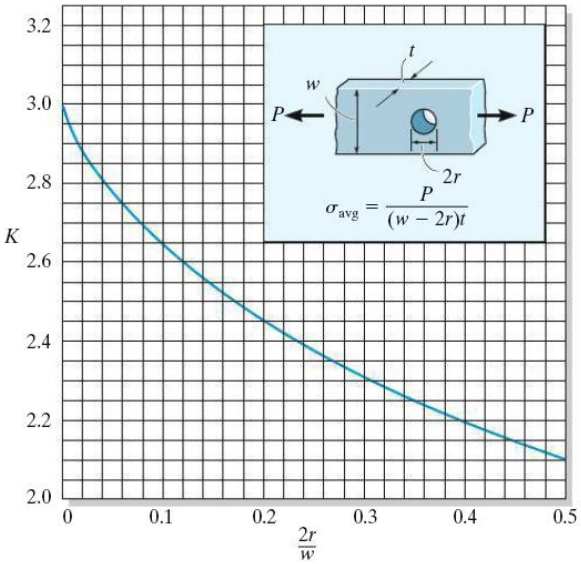
$$\tau_{\max} = \sqrt{\left(\frac{\sigma_x - \sigma_y}{2}\right)^2 + \tau_{xy}^2}$$

$$\sigma_1 = \sigma_2 = \frac{pr}{2t}$$

$$EI\frac{1}{\rho} = EI\frac{d^2y}{dx^2} = M(x)$$

$$\sigma' = \frac{\sigma_x + \sigma_y}{2}$$





Abbreviations

FBD: Free body diagram

NFD: Normal force diagram

SFD: Shear force diagram

BMD: Bending moment diagram

NSD: Normal stress diagram

DD: Deflection diagram

Good Luck

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