UFPR	Formulário	TMEC-002	Mecânica dos Sólidos I

$$x_c = \frac{x_{c_1} A_1 \pm x_{c_2} A_2}{A_1 \pm A_2} \qquad y_c = \frac{y_{c_1} A_1 \pm y_{c_2} A_2}{A_1 \pm A_2} \qquad Q_z = y_c\, A \qquad Q_y = z_c\, A$$

$$I_y = I_{y'} + z_c^2\, A \qquad I_z = I_{z'} + y_c^2\, A \qquad I = I_1 \pm I_2 \qquad I = \frac{b\, h^3}{12}$$

$$I = \frac{\pi}{4}\, c^4 \qquad I_o = \frac{\pi}{2}\, c^4 \qquad \Delta L = \int_{x_A}^{x_B} \frac{N}{E\, A}\, dx \qquad \Delta\phi = \int_{x_A}^{x_B} \frac{T}{G\, I_o}\, dx$$

$$P = T\, \omega = 2\pi\, T f \qquad \sigma = -\frac{M_z}{I_z} y - \frac{M_y}{I_y} z \qquad \tau = \frac{T}{I_o} \rho \qquad \sigma_1 = p\, \frac{r}{t}$$

$$\sigma_2 = \frac{p}{2}\, \frac{r}{t} \qquad \sigma_1 = \frac{p}{2}\, \frac{r}{t} \qquad \tau = \frac{V\, Q}{I\, t} \qquad q = \frac{V\, Q}{I}$$

$$\sigma_{x'} = \frac{\sigma_x + \sigma_y}{2} + \frac{\sigma_x - \sigma_y}{2}\, \cos 2\theta + \tau_{xy}\, \operatorname{sen} 2\theta \qquad \tau_{x'y'} = -\frac{\sigma_x - \sigma_y}{2}\, \operatorname{sen} 2\theta + \tau_{xy}\, \cos 2\theta$$

$$\operatorname{tg} 2\theta_p = \frac{2\, \tau_{xy}}{\sigma_x - \sigma_y} \qquad \sigma_{1,2} = \frac{\sigma_x + \sigma_y}{2} \pm \sqrt{\left(\frac{\sigma_x - \sigma_y}{2}\right)^2 + \tau_{xy}^2}$$

$$\operatorname{tg} 2\theta_s = -\frac{\sigma_x - \sigma_y}{2\, \tau_{xy}} \qquad \tau_{\text{máx}} = \sqrt{\left(\frac{\sigma_x - \sigma_y}{2}\right)^2 + \tau_{xy}^2} \qquad \sigma_s = \frac{\sigma_x + \sigma_y}{2}$$

$$\epsilon_{x'} = \frac{\epsilon_x + \epsilon_y}{2} + \frac{\epsilon_x - \epsilon_y}{2}\, \cos 2\theta + \frac{\gamma_{xy}}{2}\, \operatorname{sen} 2\theta \qquad \frac{\gamma_{x'y'}}{2} = -\frac{\epsilon_x - \epsilon_y}{2}\, \operatorname{sen} 2\theta + \frac{\gamma_{xy}}{2}\, \cos 2\theta$$

$$\tau_{\substack{\text{máx} \\ \text{abs}}} = \frac{\sigma_{\text{máx}} - \sigma_{\text{mín}}}{2} \qquad \operatorname{tg} 2\theta_p = \frac{\gamma_{xy}}{\epsilon_x - \epsilon_y} \qquad \operatorname{tg} 2\theta_s = -\frac{\epsilon_x - \epsilon_y}{\gamma_{xy}}$$

$$\epsilon_{1,2} = \frac{\epsilon_x + \epsilon_y}{2} \pm \sqrt{\left(\frac{\epsilon_x - \epsilon_y}{2}\right)^2 + \left(\frac{\gamma_{xy}}{2}\right)^2} \qquad \gamma_{\text{máx}} = 2\sqrt{\left(\frac{\epsilon_x - \epsilon_y}{2}\right)^2 + \left(\frac{\gamma_{xy}}{2}\right)^2}$$

$$\epsilon_s = \frac{\epsilon_x + \epsilon_y}{2} \qquad \epsilon_x = \epsilon_{0^\circ} \qquad \epsilon_y = \epsilon_{90^\circ} \qquad \gamma_{xy} = 2\, \epsilon_{45^\circ} - (\epsilon_{0^\circ} + \epsilon_{90^\circ})$$

$$\epsilon_x = \epsilon_{0^\circ} \qquad \epsilon_y = \frac{2\, \epsilon_{60^\circ} + 2\, \epsilon_{120^\circ} - \epsilon_{0^\circ}}{3} \qquad \gamma_{xy} = \frac{2\sqrt{3}}{3}\, (\epsilon_{60^\circ} - \epsilon_{120^\circ})$$

$$\epsilon_x = \frac{\sigma_x}{E} - \nu\, \frac{\sigma_y}{E} \qquad \epsilon_y = -\nu\, \frac{\sigma_x}{E} + \frac{\sigma_y}{E} \qquad \gamma_{xy} = \frac{\tau_{xy}}{G}$$

$$\sigma_x = \frac{E}{1 - \nu^2}(\epsilon_x + \nu\, \epsilon_y) \qquad \sigma_y = \frac{E}{1 - \nu^2}(\nu\, \epsilon_x + \epsilon_y) \qquad \tau_{xy} = G\, \gamma_{xy} \qquad G = \frac{E}{2\, (1 + \nu)}$$

$$\sigma_{vm} = \sqrt{\sigma_1^2 - \sigma_1 \sigma_2 + \sigma_2^2} \qquad \sigma_e \leq (\text{ou } >) \sqrt{\sigma_1^2 - \sigma_1 \sigma_2 + \sigma_2^2} \qquad S = \frac{I}{c}$$

$$S = \frac{M}{\sigma_{\text{adm}}} \qquad c = \sqrt[3]{\frac{2}{\pi\, \tau_{\text{adm}}} \sqrt{M^2 + T^2}} \qquad \frac{1}{\rho} = \frac{M}{E\, I} \qquad E\, I\, \frac{d^2}{dx^2}\, v = M$$

$$\frac{d}{dx}\left(E\, I\, \frac{d^2}{dx^2}\, v\right) = V \qquad \frac{d^2}{dx^2}\left(E\, I\, \frac{d^2}{dx^2}\, v\right) = -w \qquad v(x_-) = v(x_+) \qquad \theta(x_-) = \theta(x_+)$$

$$g = v - e$$