

This is the calculation of nominal stress, σ_n .

$$\sigma_n = \frac{P}{wh} = \frac{2900}{0.0762 * 0.0059} * 10^{-6} = 6.45046 = 6.5 \text{ MPa}$$

This is the uncertainty calculation for nominal stress, σ_n .

$$\begin{aligned} W_{\sigma_n} &= \sqrt{\left(\left(\frac{1}{wh} W_P\right)^2 + \left(-\frac{P}{w^2 h} W_w\right)^2 + \left(-\frac{P}{wh^2} W_h\right)^2\right)} \\ &= \sqrt{\left(\left(\frac{1}{0.0762 * 0.0059} * 100\right)^2 + \left(-\frac{2600}{0.0762^2 * 0.0059} * 0.0001\right)^2 + \left(-\frac{2600}{0.0762 * 0.0059^2} * 0.0001\right)^2\right)} * 10^{-6} \\ &= 0.247991362 = \pm 0.2 \text{ MPa} \end{aligned}$$

This is the calculation of hoop stress, $\sigma_{\theta\theta}$.

$$\begin{aligned} \sigma_{\theta\theta} &= \frac{NF_{\sigma}}{h} \\ \sigma_{\theta\theta} &= \frac{-2 * 6900}{0.0059} * 10^{-6} = -2.33898 = -2 \text{ MPa} \end{aligned}$$

This is the uncertainty calculation for, $\sigma_{\theta\theta}$.

$$\begin{aligned} W_{\sigma_{\theta\theta}} &= \sqrt{\left(\left(\frac{F_{\sigma}}{h} W_N\right)^2 + \left(\frac{N}{h} W_{F_{\sigma}}\right)^2 + \left(-\frac{NF_{\sigma}}{h^2} W_h\right)^2\right)} \\ &= \sqrt{\left(\left(\frac{6900}{0.0059} * 1\right)^2 + \left(\frac{-2}{0.0059} * 300\right)^2 + \left(-\frac{-2 * 6900}{0.0059^2} * 0.0001\right)^2\right)} * 10^{-6} \\ &= 1.174573928 = \pm 1 \text{ MPa} \end{aligned}$$

This is the calculation of the hoop stress normalized by the nominal stress.

$$\begin{aligned} Y &= \frac{\sigma_{\theta\theta}}{\sigma_n} \\ &= \frac{-2}{6.5} = -0.307692 = -0.3 \end{aligned}$$

This is the uncertainty calculation for the normalized hoop stress by the nominal stress.