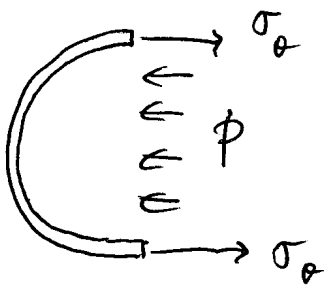
1. Consider the equilibrium of forces acting on the sectioned vessel shown



Force due to pressure p acting on circular area $\frac{\pi D^2}{4}$

$$= p\frac{\pi D^2}{4}$$

Force due to circumferential stress σ_θ acting on wall area $\pi D t$

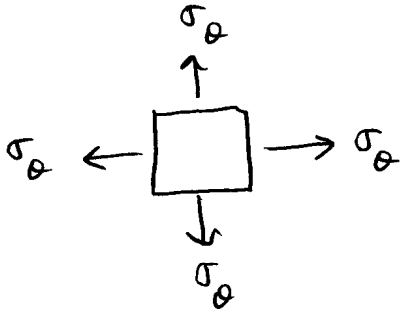
$$= \sigma_\theta \cdot \pi D t .$$

Equating forces

$$\sigma_\theta \pi D t = p\frac{\pi D^2}{4}$$

$$\therefore \sigma_\theta = \frac{pD}{4t}$$

State of stress in surface is biaxial with equal stresses σ_θ.



Strain in each direction $\varepsilon_\theta = \frac{1}{E}(\sigma_\theta - \nu\sigma_\theta)$

$$\therefore \varepsilon_\theta = \frac{\sigma_\theta}{E}(1-\nu)$$