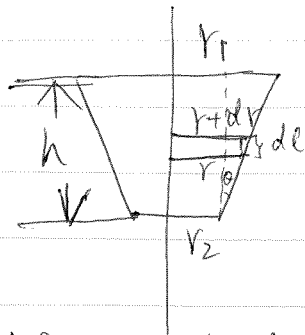


HW Solution 25.63 & 25.79.

25.63



$$\tan \theta = \frac{r_1 - r_2}{h}$$

$$\frac{dr}{dl} = \tan \theta$$

(a) for a single disk: $dR = \frac{\rho dl}{\pi r^2} = \frac{\rho}{\pi r^2 \tan \theta} dl = \frac{\rho}{\pi \left(\frac{r_1 - r_2}{h}\right)} \cdot \frac{1}{r^2} dr$

$$R = \int_{r_2}^{r_1} dR = \int_{r_2}^{r_1} \frac{\rho}{\pi \left(\frac{r_1 - r_2}{h}\right)} \frac{1}{r^2} dr = \frac{\rho}{\pi \left(\frac{r_1 - r_2}{h}\right)} \cdot \left(\frac{1}{r_2} - \frac{1}{r_1}\right)$$

$$= \frac{\rho h}{\pi r_1 r_2}$$

(b) when $r_1 = r_2$ $R = \frac{\rho h}{\pi r^2} = \frac{\rho h}{A}$

25.79 (a) $\mathcal{E}_1 - \mathcal{E}_2 + I(r_1 + r_2 + R) = 0$
 $I = 0.4 \text{ A}$

(b) $I^2 R = (0.4)^2 \times 8 \text{ W} = \cancel{0.78 \text{ W}} \cdot 1.28 \text{ W}$

$I^2 (r_1 + r_2) = \cancel{0.24 \text{ W}} \cdot 0.32 \text{ W}$

Total: $\cancel{0.96 \text{ W} + 0.24 \text{ W} = 1.2 \text{ W}} \cdot 0.32 \text{ W} + 1.28 \text{ W} = 1.6 \text{ W}$

(c) 12.0 V $P_1 = \mathcal{E}_1 I = 12 \times 0.4 = 4.8 \text{ W}$

(d) 8.0 V $P_2 = \mathcal{E}_2 I = 8 \times 0.4 = 3.2 \text{ W}$

(e) production = $4.8 - 3.2 = 1.6 \text{ W} = \text{consumption}$