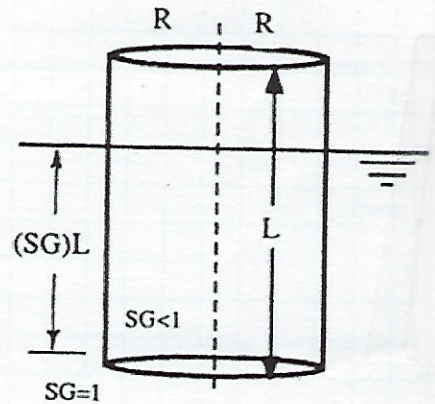


2.135 Consider a homogeneous right circular cylinder of length L , radius R , and specific gravity SG , floating in water ($SG = 1$) with its axis vertical. Show that the body is stable if

$$R/L > [2SG(1 - SG)]^{1/2}$$

$$GM = \frac{I_{oo}}{V} - GB$$



$$\sum F_v = 0 = -W + B = -\gamma_s \pi R^2 L + \gamma_w \pi R^2 d$$

$$d = SG L$$

$$SG = \frac{\rho_s}{\rho_w}$$

$$GM = \frac{I_{oo}}{V} - GB = \frac{\pi R^4 / 4}{\pi R^2 SG L} - \left(\frac{L}{2} - \frac{SG L}{2} \right)$$

$$= \frac{R^2}{4 SG L} - \frac{L}{2} (1 - SG)$$

$$\frac{4 GM SG}{L} = \frac{R^2}{L^2} - 2 SG (1 - SG)$$

$$\text{ie } R/L > [2 SG (1 - SG)]^{1/2} \quad \text{for } GM > 0$$

$$\text{if } SG = .8 \quad R/L > .566$$