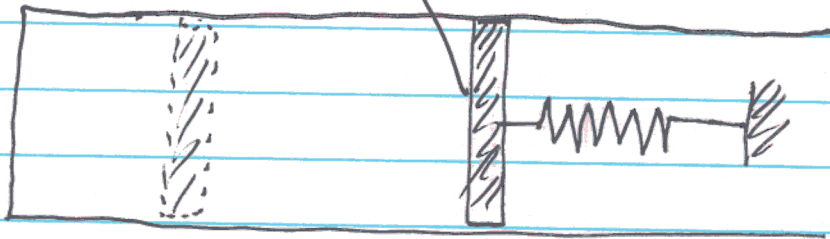


M.S. 2.31

$$A = 0.018 \text{ m}^2$$



$$P_{atm} = 100 \text{ kPa}$$

①

②

$$V_1 = 0.003 \text{ m}^3$$

$$V_2 = 0.002 \text{ m}^3$$

$$F_{sp} = 900 \text{ N}$$

$$F_{sp} = 0 \text{ N}$$

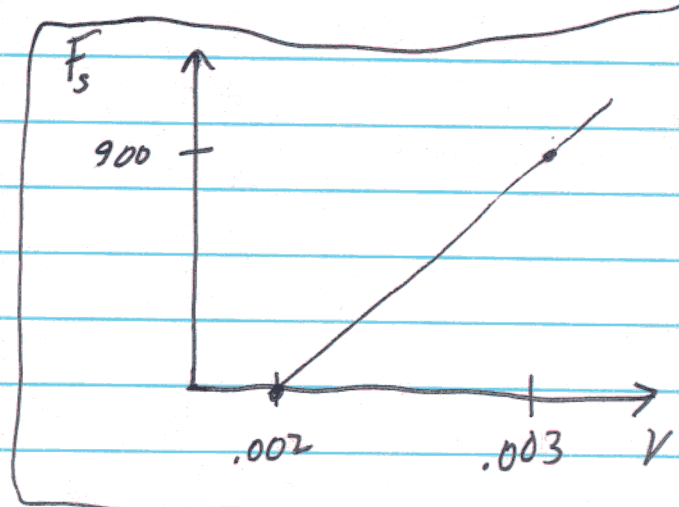
$$P_1 = ?$$

$$P_2 = ?$$

$$W_{air} = ?$$

$$F_{sp} = \left(\frac{900 - 0}{0.003 - 0.002} \right) V + b \text{ (N)}$$

$$F_{sp} = 900,000(V) + b \text{ (N)}$$



$$F(0.002) = 0 = (900000)(0.002) + b \Rightarrow b = -1800$$

$$F_{sp} = 900000V - 1800 \text{ N}$$

$$P_{cyl} = P_{atm} + \frac{F_{sp}}{A} = 100000 + \frac{(900000V - 1800) \text{ N}}{0.018 \text{ m}^2} \text{ (Pa)}$$

$$W = \int_{V_2}^{V_1} P_{cyl} dV = \int_{0.003}^{0.002} \left(100000 + \frac{(900000V - 1800)}{0.018} \right) dV$$

M.S. 2.31 (cont'd)

$$W_1 = \int_{.003}^{.002} (50 \times 10^6) V dV = \left. \frac{50 \times 10^6 V^2}{2} \right|_{.003}^{.002} m^3$$

$$W_2 = -125 \text{ J}$$

$$+ \frac{0 \text{ N}}{.018 \text{ m}^2} = 150,000 \text{ Pa}$$

$$P_{\text{atm}} + \frac{0 \text{ N}}{.018 \text{ m}^2} = 100,000 \text{ Pa}$$