1.76 Estimate the increase in pressure (in psi) required to decrease a unit volume of mercury by 0.1%.

\[ E_V = - \frac{dP}{dV/V} \quad (Eq. 1.12) \]

Thus,

\[ \Delta P \approx - \frac{E_V \Delta V}{V} = - \left( 4.14 \times 10^6 \frac{lb}{in^2} \right)(-0.001) \]

\[ \Delta P \approx 4.14 \times 10^3 \text{ psi} \]

1.77 A 1-m³ volume of water is contained in a rigid container. Estimate the change in the volume of the water when a piston applies a pressure of 35 MPa.

\[ E_V = - \frac{dP}{dV/V} \quad (Eq. 1.12) \]

Thus,

\[ \Delta V \approx - \frac{V \Delta P}{E_V} = - \frac{(1 \text{ m}^3)(35 \times 10^6 \text{ N/m}^2)}{2.15 \times 10^9 \text{ N/m}^2} = -0.0163 \text{ m}^3 \]

or

\[ \text{decrease in volume} \approx 0.0163 \text{ m}^3 \]