2.97 The open U-tube of Fig. P2.97 is partially filled with a liquid. When this device is accelerated with a horizontal acceleration, a, a differential reading, h, develops between the manometer legs which are spaced a distance ℓ apart. Determine the relationship between a, ℓ, and h.
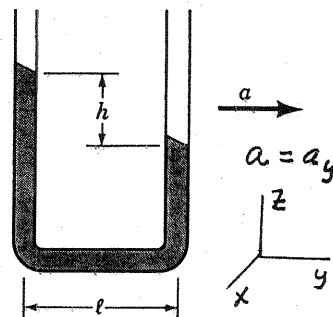

FIGURE P2.97

$$\frac{dz}{dy} = - \frac{a_y}{g + a_z} \qquad (Eq. \ 2.28)$$

Since, $\quad \dfrac{dz}{dy} = - \dfrac{h}{\ell} \qquad$ and $\quad a_z = 0$

then $\quad -\dfrac{h}{\ell} = - \dfrac{a}{g+0}$

or

$$h = \frac{a\,\ell}{g}$$