Chapter 15   Problem 23 [†]

Given

$\Delta P = 100 \ kPa$

$\Delta h = 6.0 \ m$

Solution

Find the density of the fluid.

The hydrostatic equation states

$$\frac{dP}{dh} = \rho g$$

Solving for density gives

$$\rho = \frac{1}{g}\frac{dP}{dh}$$

For the given interval the differential can be replaced with a difference

$$\rho = \frac{1}{g}\frac{\Delta P}{\Delta h}$$

Now solve for density

$$\rho = \frac{1}{(9.8 \ m/s^2)}\frac{1.0 \times 10^5 \ Pa}{(6.0 \ m)}$$

$$\rho = 1.7 \times 10^3 \ kg/m^3$$

[†]Problem from Essential University Physics, Wolfson