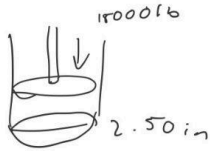


1.48) Pressure problem

18000 lb

pressure of oil?



- incompressible fluid
- isothermal process
- $F = 18000 \text{ lb}$
- $D = 2.50 \text{ in}$

$$A = \frac{\pi}{4} \cdot D^2 = \frac{\pi}{4} \cdot (2.5")^2 = 4.909 \text{ in}^2$$

$$P = \frac{F}{A} = \frac{18000 \text{ lb}}{4.909 \text{ in}^2} = 3666.73 \frac{\text{lb}}{\text{in}^2} = 3666.73 \text{ psi}$$

1.58) Bulk modulus

$$E = - \frac{\Delta P}{\Delta V/V} \rightarrow \Delta P = -E \left(\frac{\Delta V}{V} \right)$$

$$\frac{\Delta V}{V} = -0.01 \text{ (1\% decrease)}$$

$$\text{Bulk Modulus: } 3,590,000 \text{ psi} \\ 24,750 \text{ MPa}$$

$$\Delta P = - (3,590,000 \text{ psi}) (-0.01) \\ = 35900 \text{ psi}$$

$$\Delta P = - (24,750 \text{ MPa}) (-0.01) \\ = 247.5 \text{ MPa}$$

Chapter 2

2.17) 4 Non-Newtonian Fluids:

- Ketchup
- Toothpaste
- Blood
- Paint

2.18) value of viscosity for water at 40°C

$$6.5 \times 10^{-4} \text{ Pa}$$

Chapter 3

3.6) True, at earth's surface, $P_{\text{atm}} > 0$, so absolute pressure is always greater than gauge pressure

3.7) false, atmospheric pressure changes w/ elevation & weather, so it is not always 14.7 psia.

3.8) False: absolute pressure cannot be negative

3.9) True: negative gauge pressure is valid for vacuum conditions