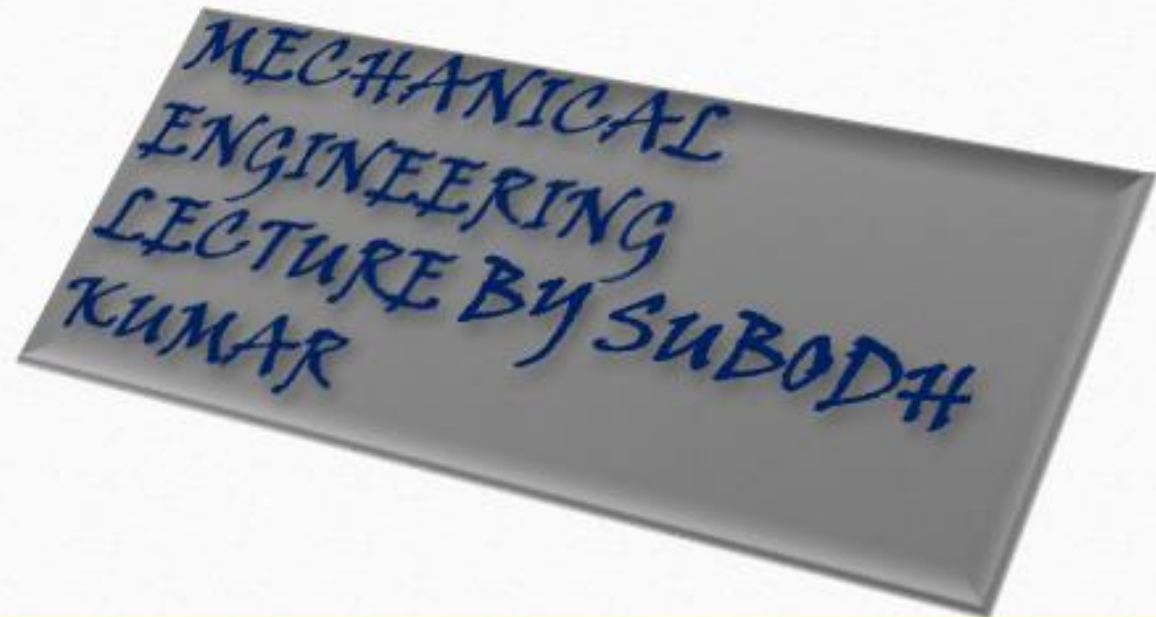




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- Surface tension on liquid droplet, hollow bubble and liquid jet

(1) Pressure inside a liquid droplet

$$P = \frac{4\sigma}{d}$$

(2) Pressure inside a hollow bubble

$$P = \frac{8\sigma}{d}$$

(3) Pressure inside a liquid jet

$$P = \frac{\sigma \times 2L}{L \times d}$$

Question :

The pressure outside the droplet of water of diameter 0.04 mm is 10.32 N/cm² (atmospheric pressure) calculate the pressure with in the droplet if surface tension is given as 0.0725 N/m of water.

$$d = 0.04 \text{ mm} = 0.04 \times 10^{-3} \text{ m}$$

$$P_o = 10.32 \text{ N/cm}^2 = 10.32 \times 10^4 \text{ N/m}^2$$

$$\sigma = 0.075 \text{ N/m}$$

$$P = \frac{4\sigma}{d}$$

$$\Delta P = \frac{4\sigma}{d}$$

$$P_i - P_o = \frac{4\sigma}{d}$$

$$P_i - 10.32 \times 10^4 = \frac{4 \times 0.0725}{0.04 \times 10^{-3}}$$

$$P_i - 10.32 \times 10^4 = 7250 \text{ N/m}^2$$

$$P_i = 7250 + 10.32 \times 10^4$$

$$P_i = 110450 \text{ N/m}^2$$

$$P_i = 11.045 \text{ N/cm}^2$$

Question:

Find the surface tension in a soap bubble of 40 mm diameter when the inside pressure is 2.5 N/m² above atmospheric pressure.

$$d = 40 \text{ mm} = 40 \times 10^{-3}$$

$$P = 2.5 \text{ N/m}^2$$

$$P = \frac{8\sigma}{40 \times 10^{-3}}$$

$$\sigma = \frac{2.5 \times 40 \times 10^{-3}}{8}$$

$$\sigma = 0.0125 \text{ N/m}$$

THANKYOU