PH-105 Assignment Sheet - 1

Umang Mathur

10. **A light beam is propagating through a block of glass with index of refraction (η) 1.2. If the glass is moving at a constant velocity 0.8c in the same direction as beam what is the velocity of light in the block as observed by an observer in the laboratory?**

Solution :

By the definition of refractive index, speed of light in S' $= c/\eta$

Now, using inverse velocity tramsformation and noting that $v = 0.8c$ and $u'_x = c/\eta$, we have:

$$\begin{aligned} u_x &= \frac{u'_x + v}{1 + \frac{u'_x v}{c^2}} \\ &= \frac{\frac{c}{1.2} + 0.8c}{1 + \frac{\frac{c}{1.2}0.8c}{c^2}} \\ &= \mathbf{0.98c} \end{aligned}$$