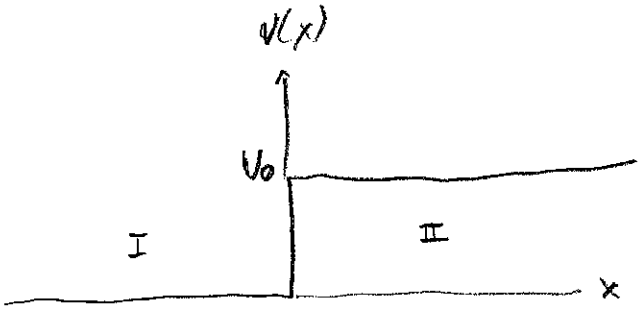
Physics 267 Problem # 14 Solutions




$$\psi_I(x) = A e^{ikx} + B e^{-ikx} \qquad k = \frac{\sqrt{2mE}}{\hbar}$$

$$\psi_{II}(x) = C e^{\kappa x} + D e^{-\kappa x} \qquad \kappa = \frac{\sqrt{2m(V_0 - E)}}{\hbar}$$

$\psi(x)$ continuous at boundary $(x=0)$

$$A + B = D \qquad (1)$$

$\psi'(x)$ continuous

$$\psi_I'(x) = A(ik)e^{ikx} + B(-ik)e^{-ikx}$$

$$\psi_{II}'(x) = -\kappa D e^{-\kappa x}$$

at boundary $(x=0)$

$$ikA - ikB = -\kappa D \qquad (2)$$

sub (1) into (2)

$$ikA - ikB = -\kappa(A+B)$$

$$A(\kappa + ik) = B(-\kappa + ik)$$

$$B = A\left(\frac{\kappa + ik}{-\kappa + ik}\right)$$

$$\frac{|B|^2}{|A|^2} = \frac{|\kappa + ik|^2}{|-\kappa + ik|^2} = \frac{(\kappa + ik)(\kappa - ik)}{(-\kappa + ik)(-\kappa - ik)} = \frac{\kappa^2 + k^2}{\kappa^2 + k^2} = 1$$