Solution

Region 1: $x < -a$, region 2: $a > x > -a$, region 3: $x > a$.

$$\psi_1(x) = Ae^{ikx} + A_R e^{-ikx}, \quad \psi_2(x) = Ce^{ik'x} + De^{-ik'x}, \quad \psi_3(x) = A_T e^{ikx}$$

where $k = \frac{1}{\hbar}\sqrt{2mE}$, $k' = \frac{1}{\hbar}\sqrt{2m(E - V_0)}$.

Continuity of $\psi(x)$ and $\psi'(x)$:

$$x = -a \qquad\qquad x = a$$

$$Ae^{-ika} + A_R e^{ika} = Ce^{-ik'a} + De^{ik'a} \qquad Ce^{ik'a} + De^{-ik'a} = A_T e^{ika}$$

$$Ae^{-ika} - A_R e^{ika} = \frac{k'}{k}(Ce^{-ik'a} - De^{ik'a}) \qquad Ce^{ik'a} - De^{-ik'a} = \frac{k}{k'} A_T e^{ika}$$

$$\Rightarrow \quad A = C\frac{k+k'}{2k}e^{i(k-k')a} + D\frac{k-k'}{2k}e^{i(k+k')a}, \quad C = \frac{k+k'}{2k'}A_T e^{i(k-k')a}, \quad D = \frac{k-k'}{2k'}A_T e^{i(k+k')a},$$

so

$$\frac{A_T}{A} = e^{-2ika}\Big[\frac{(k+k')^2}{4kk'}e^{-2ik'a} + \frac{(k-k')^2}{4kk'}e^{2ik'a}\Big]^{-1}$$

$$\Rightarrow \quad \Big|\frac{A_T}{A}\Big|^2 = \Big[1 + \frac{(k^2 - k'^2)^2}{4k^2k'^2}\cos^2 2k'a\Big]^{-1}$$