

$$\mathbf{k}_i = \begin{pmatrix} k_{ix} \\ k_{iy} \\ k_{iz} \end{pmatrix}$$

$$\mathbf{k}_r = \begin{pmatrix} k_{rx} \\ k_{ry} \\ k_{rz} \end{pmatrix}$$

$$\mathbf{k}_t = \begin{pmatrix} k_{tx} \\ k_{ty} \\ k_{tz} \end{pmatrix}$$

$$E_1(r) = E_0 e^{ik_1 r}, E_2(r) = E_0 e^{ik_2 r}, E_3(r) = E_0 e^{ik_3 r}$$









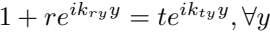


$$e^{i\sqrt{2}p_1} + p e^{i\sqrt{2}p_1} = e^{i\sqrt{2}p_1} x = 0$$



$$e^{\frac{1}{2}k^2x^2} + \text{re}^{\frac{1}{2}k^2x^2} = \text{te}^{\frac{1}{2}k^2x^2}, \quad \text{v}^2(x, y)$$







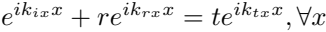


$$1 + \cos(\pi v) = \cos(\pi v)$$











$$1 + p_e(x) - p_e(x) = p_e(x)$$



0 1 2 3 4 5 6 7 8 9





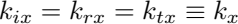
$$\begin{aligned}
 & \mathbb{E}[\mathcal{L}_1] = \mathbb{E}[\mathcal{L}_2] \\
 & \mathbb{E}[\mathcal{L}_1] = \mathbb{E}[\mathcal{L}_2]
 \end{aligned}$$

$$\begin{cases} k_{ix} = n_1 k_0 \sin \theta_i \\ k_{rx} = n_1 k_0 \sin \theta_r \\ k_{tx} = n_2 k_0 \sin \theta_t \end{cases}$$

$$\left\{ \begin{array}{l} \theta_i = \theta_r \\ r_1 \sin \theta_i = r_2 \sin \theta_t \end{array} \right.$$

$$\frac{d}{dt} \left( \frac{1}{2} m v^2 \right) = \frac{d}{dt} \left( \frac{1}{2} m \frac{dx}{dt} \frac{dx}{dt} \right) = m \frac{dx}{dt} \frac{d^2 x}{dt^2} = m v \frac{dv}{dt}$$



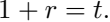


1. 1 = 2

$$\Rightarrow \begin{cases} k_x^2 + k_{iz}^2 = \epsilon_1 k_0^2 \\ k_x^2 + k_{rz}^2 = \epsilon_1 k_0^2 \\ k_x^2 + k_{tz}^2 = \epsilon_2 k_0^2 \end{cases} \Rightarrow k_{iz} = \pm \sqrt{\epsilon_1 k_0^2 - k_x^2} = -k_{rz}$$



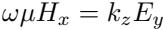




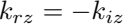








$$\frac{k_{iz}}{\mu_1} E_{iz} + \frac{k_{rz}}{\mu_1} E_{rz} = \frac{k_{tz}}{\mu_2} E_{tz}$$





$$\frac{k_{iz}}{\mu_1} - \frac{k_{iz}}{\mu_1} r = \frac{k_{tz}}{\mu_2} t,$$

$$1 - r = \frac{\mu_1 k_{t2}}{\mu_2 k_{i2}} t$$

$$\begin{cases} 1+r=t \\ 1-r=\frac{\mu_1}{\mu_2}\frac{k_{tz}}{k_{iz}}t \end{cases}$$





$$t_{12}^s = \frac{2\mu_2 k_{z1}}{\mu_2 k_{z1} + \mu_1 k_{z2}},$$

$$r_{12}^s = \frac{\mu_2 k_{z1} - \mu_1 k_{z2}}{\mu_2 k_{z1} + \mu_1 k_{z2}}.$$

$$t_{12}^s = \frac{2}{1 + K_s}, \quad r_{12}^s = \frac{1 - K_s}{1 + K_s}, \quad K_s := \frac{\mu_1}{\mu_2} \frac{k_{z2}}{k_{z1}}$$





$$\rho_{12}^p = \frac{\varepsilon_2 k_{z1} - \varepsilon_1 k_{z2}}{\varepsilon_2 k_{z1} + \varepsilon_1 k_{z2}} = \frac{1 - K^p}{1 + K^p}, \quad r_{12}^s = \frac{\mu_2 k_{z1} - \mu_1 k_{z2}}{\mu_2 k_{z1} + \mu_1 k_{z2}} = \frac{1 - K^s}{1 + K^s}$$

$$\tau_{12}^p = \frac{2\varepsilon_2 k_{z1}}{\varepsilon_2 k_{z1} + \varepsilon_1 k_{z2}} = \frac{2}{1 + K^p}, \quad t_{12}^s = \frac{2\mu_2 k_{z1}}{\mu_2 k_{z1} + \mu_1 k_{z2}} = \frac{2}{1 + K^s}$$

NP

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$$\frac{E_1 \wedge E_2}{E_2 \wedge E_1}$$

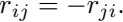
Ne

2

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Ne 2 2  
Ne 2 1







$$r^p = \frac{n_2 \cos \theta - n_1 \sqrt{1 - \frac{n_1^2}{n_2^2} \sin^2 \theta}}{n_2 \cos \theta + n_1 \sqrt{1 - \frac{n_1^2}{n_2^2} \sin^2 \theta}}$$