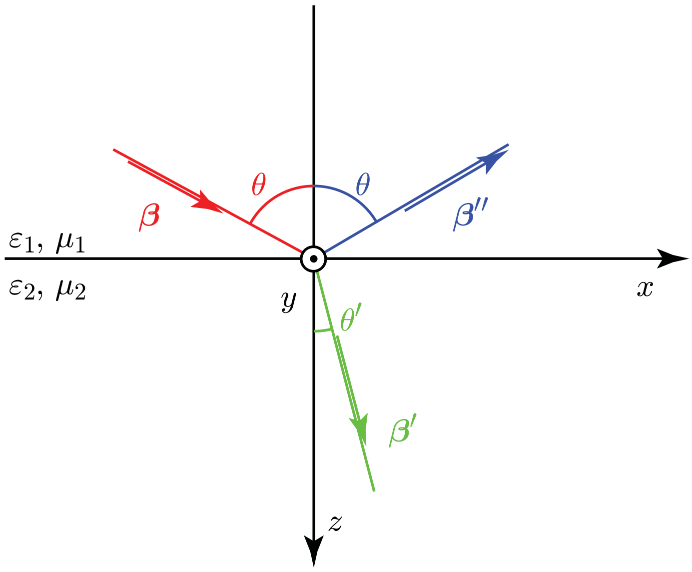
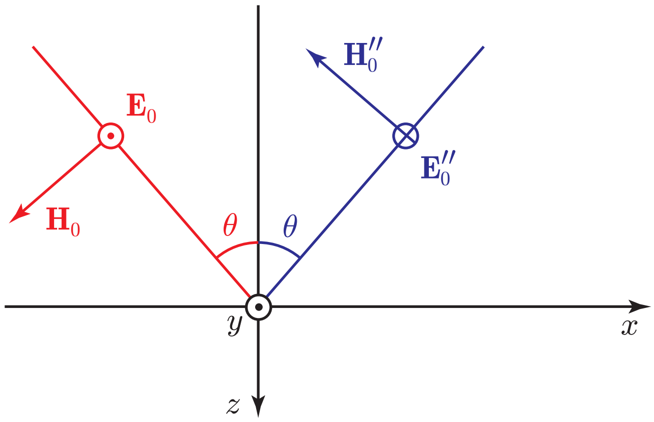


$$\mu_1 = \mu_2 = \mu_0,\ \epsilon_1'' = \epsilon_2'' = g_1 = g_2 = 0$$

$$\mathbf{E}(\mathbf{r}) = E_0\, e^{-j\beta(\sin\theta\, x + \cos\theta\, z)}\,\mathbf{y}_0$$

$$\mathbf{E}''(\mathbf{r}) = q_{Eh}\, E_0\, e^{-j\beta(\sin\theta\, x - \cos\theta\, z)}\,\mathbf{y}_0$$

$$\begin{aligned}
\mathbf{E}_{tot}(\mathbf{r}) &= E_0\, e^{-j\beta\sin\theta\, x}\left(e^{-j\beta\cos\theta\, z} + q_{Eh}\, e^{+j\beta\cos\theta\, z}\right)\,\mathbf{y}_0 \\
&= E_0\, e^{-j\beta\sin\theta\, x}\left(e^{-j\beta\cos\theta\, z} + q_{Eh}\, e^{-j\beta\cos\theta\, z} - q_{Eh}\, e^{-j\beta\cos\theta\, z} + q_{Eh}\, e^{+j\beta\cos\theta\, z}\right)\,\mathbf{y}_0 \\
&= E_0\, e^{-j\beta\sin\theta\, x}[\underbrace{(1 + q_{Eh})}_{t_{Eh}}\, e^{-j\beta\cos\theta\, z} + j\, 2\, q_{Eh}\sin(\beta\cos\theta\, z)]\,\mathbf{y}_0
\end{aligned}$$

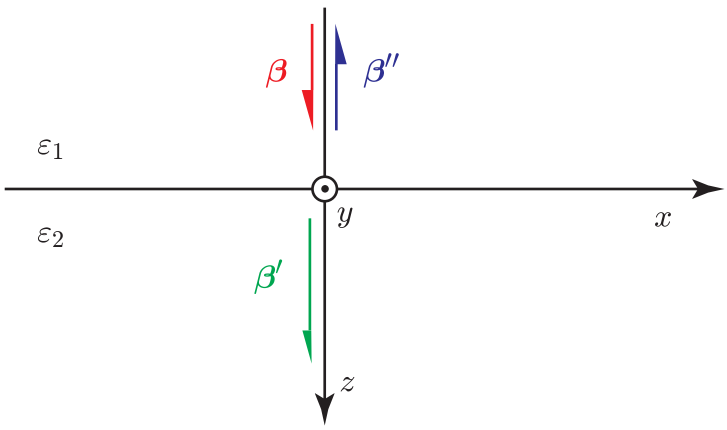


$$\epsilon_1 = \epsilon_0,\ \mu_1 = \mu_0,\ g_1 = 0; \quad g_2 = \infty$$

$$
\begin{aligned}
\mathbf{E}(\mathbf{r}) &= E_0\, e^{-j\beta(\sin\theta\, x + \cos\theta\, z)}\, \mathbf{y}_0 \\
\mathbf{E}''(\mathbf{r}) &= -E_0\, e^{-j\beta(\sin\theta\, x - \cos\theta\, z)}\, \mathbf{y}_0 \\
\mathbf{E}_{\text{tot}}(\mathbf{r}) &= E_0\, e^{-j\beta\sin\theta\, x} \left(e^{-j\beta\cos\theta\, z} - e^{j\beta\cos\theta\, z}\right) \mathbf{y}_0 \\
&= -2\, j\, E_0\, e^{-j\beta\sin\theta\, x}\, \sin(\beta\cos\theta\, z)\, \mathbf{y}_0
\end{aligned}
$$

$$
\begin{aligned}
\mathbf{H}(\mathbf{r}) &= \frac{E_0}{\eta_0}\, e^{-j\beta(\sin\theta\, x + \cos\theta\, z)} (-\mathbf{x}_0 \cos\theta + \mathbf{z}_0 \sin\theta) \\
\mathbf{H}''(\mathbf{r}) &= \frac{E_0}{\eta_0}\, e^{-j\beta(\sin\theta\, x - \cos\theta\, z)} (-\mathbf{x}_0 \cos\theta - \mathbf{z}_0 \sin\theta) \\
\mathbf{H}_{\text{tot}}(\mathbf{r}) &= \frac{E_0}{\eta_0}\, e^{-j\beta\sin\theta\, x} \left[e^{-j\beta\cos\theta\, z} (-\mathbf{x}_0\cos\theta + \mathbf{z}_0\sin\theta) \right. \\
&\qquad \left. + e^{j\beta\cos\theta\, z} (-\mathbf{x}_0\cos\theta - \mathbf{z}_0\sin\theta)\right] \\
&= \frac{E_0}{\eta_0}\, e^{-j\beta\sin\theta\, x} \left[-\left(e^{j\beta\cos\theta\, z} + e^{-j\beta\cos\theta\, z}\right) \mathbf{x}_0\cos\theta \right. \\
&\qquad \left. - \left(e^{j\beta\cos\theta\, z} - e^{-j\beta\cos\theta\, z}\right) \mathbf{z}_0 \sin\theta\right] \\
&= 2\, \frac{E_0}{\eta_0}\, e^{-j\beta\sin\theta\, x} \left[-\cos(\beta\cos\theta\, z)\, \mathbf{x}_0 \cos\theta - j\, \sin(\beta\cos\theta\, z)\, \mathbf{z}_0 \sin\theta\right]
\end{aligned}
$$

$$
\begin{aligned}
\boldsymbol{\mathcal{P}}_{\text{tot}} &= \frac{1}{2}\, \mathbf{E}_{\text{tot}} \times \mathbf{H}^*_{\text{tot}} \\
&= -2\, j\, \frac{|E_0|^2}{\eta_0} \sin(\beta\cos\theta\, z) \left[-\cos(\beta\cos\theta\, z)\, \overbrace{(\mathbf{y_0} \times \mathbf{x_0})}^{-\mathbf{z}_0} \cos\theta \right. \\
&\qquad \left. + j\sin(\beta\cos\theta\, z)\, \underbrace{(\mathbf{y_0} \times \mathbf{z_0})}_{\mathbf{x}_0} \sin\theta\right] \\
&= 2\, \frac{|E_0|^2}{\eta_0} \left[\sin^2(\beta\cos\theta\, z)\, \mathbf{x_0}\, \sin\theta - j\sin(\beta\cos\theta\, z)\cos(\beta\cos\theta\, z)\, \mathbf{z_0}\, \cos\theta\right] \\
&= \frac{|E_0|^2}{\eta_0} \left\{[1 - \cos(2\,\beta\cos\theta\, z)]\, \mathbf{x_0}\, \sin\theta - j\sin(2\,\beta\cos\theta\, z)\, \mathbf{z_0}\, \cos\theta\right\}
\end{aligned}
$$



$$\mu_1 = \mu_2 = \mu_0,\ \epsilon_1'' = \epsilon_2'' = g_1 = g_2 = 0$$

$$\begin{aligned}
\mathbf{E}(\mathbf{r}) &= E_0\, e^{-j\beta z}\, \mathbf{y}_0 \\
\mathbf{E}''(\mathbf{r}) &= q_E\, E_0\, e^{j\beta z}\, \mathbf{y}_0 \\
\mathbf{E}_{\text{tot}}(\mathbf{r}) &= E_0 \left(e^{-j\beta z} + q_E\, e^{j\beta z}\right) \mathbf{y}_0 \\
&= E_0 \left(e^{-j\beta z} + q_E\, e^{-j\beta z} - q_E\, e^{-j\beta z} + q_E\, e^{j\beta z}\right) \mathbf{y}_0 \\
&= E_0 \left[(1+q_E)e^{-j\beta z} + 2\, j\, q_E\, \sin(\beta z)\right] \mathbf{y}_0
\end{aligned}$$

$$\begin{aligned}
\mathbf{H}(\mathbf{r}) &= -\frac{E_0}{\eta_1}\, e^{-j\beta z}\, \mathbf{x}_0 \\
\mathbf{H}''(\mathbf{r}) &= q_E\, \frac{E_0}{\eta_1}\, e^{j\beta z}\, \mathbf{x}_0 \\
\mathbf{H}_{\text{tot}}(\mathbf{r}) &= -\frac{E_0}{\eta_1} \left(e^{-j\beta z} - q_E\, e^{j\beta z}\right) \mathbf{x}_0 \\
&= -\frac{E_0}{\eta_1} \left(e^{-j\beta z} - q_E\, e^{-j\beta z} + q_E\, e^{-j\beta z} - q_E\, e^{j\beta z}\right) \mathbf{x}_0 \\
&= -\frac{E_0}{\eta_1} \left[(1-q_E)e^{-j\beta z} - 2\, j\, q_E\, \sin(\beta z)\right] \mathbf{x}_0
\end{aligned}$$

$$\begin{aligned}
\boldsymbol{\mathcal{P}}_{\text{tot}} = \frac{1}{2}\, \mathbf{E}_{\text{tot}} \times \mathbf{H}^*_{\text{tot}} &= -\frac{|E_0|^2}{2\eta_1} \left(e^{-j\beta z} + q_E\, e^{j\beta z}\right) \left(e^{j\beta z} - q_E\, e^{-j\beta z}\right) \overbrace{(\mathbf{y_0} \times \mathbf{x_0})}^{-\mathbf{z}_0} \\
&= \frac{|E_0|^2}{2\eta_1} \left(1 - q_E\, e^{-2j\beta z} + q_E\, e^{2j\beta z} - q_E^2\right) \mathbf{z}_0 \\
&= \frac{|E_0|^2}{2\eta_1} \left[(1-q_E^2) + 2\, j\, q_E\, \sin(2\beta z)\right] \mathbf{z}_0
\end{aligned}$$

$$\begin{aligned}
\mathbf{E}'(\mathbf{r}) &= (1+q_E)\, E_0\, e^{-j\beta' z}\, \mathbf{y}_0 \\
\mathbf{H}'(\mathbf{r}) &= -(1-q_E)\, \frac{E_0}{\eta_1}\, e^{-j\beta' z}\, \mathbf{x}_0 \\
\boldsymbol{\mathcal{P}}' = \frac{1}{2}\, \mathbf{E}' \times \mathbf{H}'^* &= -(1+q_E)(1-q_E)\, \frac{|E_0|^2}{2\eta_1}\, (\mathbf{y_0} \times \mathbf{x_0}) \\
&= (1-q_E^2)\, \frac{|E_0|^2}{2\eta_1}\, \mathbf{z_0}
\end{aligned}$$