(4) The TE wave has only a y component. The incidence angle is θ

$E_i = E_0 \cdot e^{j(\omega \cdot t - k \cdot s)}$ incident wave

$E_r = \rho \cdot E_{0c}{}^{j \cdot (\omega \cdot t + k \cdot s1)}$ reflected wave

At a perfect conductor ρ=-1

$$s = k \cdot z \cdot \cos(\theta) + k \cdot x \cdot \sin(\theta)$$

$$s1 = k \cdot z \cdot \cos(\theta) - k \cdot x \cdot \sin(\theta)$$

Total electric field is

$$E_{total} = E_i + E_r = E_0 \cdot e^{j(\omega \cdot t - k \cdot z \cdot \cos(\theta) - k \cdot x \cdot \sin(\theta))} - E_0 \cdot e^{j \cdot (\omega \cdot t + k \cdot z \cdot \cos(\theta) - k \cdot x \cdot \sin(\theta))}$$

$$E_{total} = E_0 \cdot e^{j \cdot (\omega \cdot t - k \cdot x \cdot \sin(\theta))} \cdot \left(e^{-j \cdot k \cdot z \cdot \cos(\theta)} - e^{j \cdot k \cdot z \cdot \cos(\theta)}\right)$$

$$E_{total} = E_0 \cdot e^{j \cdot (\omega \cdot t - k \cdot x \cdot \sin(\theta))} \cdot (-2 \cdot j \cdot \sin(k \cdot z \cdot \cos(\theta)))$$

The electric field is zero where sin(kzcos(θ))=0

This happens where kzcos(θ)=π, or when

$$z = \frac{\lambda}{2 \cdot \cos(\theta)}$$

The magnetic field components are found from

$$H_i = \frac{E_i}{Z_0} \qquad H_r = \frac{-E_r}{Z_0}$$

The total x-directed magnetic field is

$$H_x = -H_i \cdot \cos(\theta) + H_r \cdot \cos(\theta)$$

The total z-directed magnetic field is

$$H_z = H_i \cdot \sin(\theta) + H_r \cdot \sin(\theta)$$