

## Field Components of TE Mode waves in Rectangular wave guide.

$$E_x = \frac{j\omega\mu}{h^2} H_0 \left(\frac{n\pi}{b}\right) \cos\left(\frac{m\pi}{a}\right)x \cdot \sin\left(\frac{n\pi}{b}\right)y \cdot e^{-\gamma z}$$

$$E_y = \frac{-j\omega\mu}{h^2} H_0 \left(\frac{m\pi}{a}\right) \sin\left(\frac{m\pi}{a}\right)x \cdot \cos\left(\frac{n\pi}{b}\right)y \cdot e^{-\gamma z}$$

$$E_z = 0.$$

$$H_x = \frac{j\beta}{h^2} H_0 \left(\frac{m\pi}{a}\right) \sin\left(\frac{m\pi}{a}\right)x \cdot \cos\left(\frac{n\pi}{b}\right)y \cdot e^{-\gamma z}$$

$$H_y = \frac{j\beta}{h^2} H_0 \left(\frac{n\pi}{b}\right) \cos\left(\frac{m\pi}{a}\right)x \cdot \sin\left(\frac{n\pi}{b}\right)y \cdot e^{-\gamma z}$$

$$H_z = H_0 \cdot \cos\left(\frac{m\pi}{a}\right)x \cdot \cos\left(\frac{n\pi}{b}\right)y \cdot e^{-\gamma z}$$

$$\eta = \frac{\eta'}{\sqrt{1 - \left(\frac{fc}{f}\right)^2}}$$

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$$E_y = \frac{-j\beta}{h^2} E_0 \left(\frac{n\pi}{b}\right) \sin\left(\frac{m\pi}{a}\right)x \cdot \cos\left(\frac{n\pi}{b}\right)y \cdot e^{-\gamma z}$$

$$E_z = E_0 \cdot \sin\left(\frac{m\pi}{a}\right)x \cdot \sin\left(\frac{n\pi}{b}\right)y \cdot e^{-\gamma z}$$

$$H_x = \frac{j\omega\epsilon_e}{h^2} E_0 \left(\frac{n\pi}{b}\right) \sin\left(\frac{m\pi}{a}\right)x \cdot \cos\left(\frac{n\pi}{b}\right)y \cdot e^{-\gamma z}$$

$$H_y = \frac{-j\omega\epsilon_e}{h^2} E_0 \left(\frac{m\pi}{a}\right) \cos\left(\frac{m\pi}{a}\right)x \cdot \sin\left(\frac{n\pi}{b}\right)y \cdot e^{-\gamma z}$$

$$H_z = 0.$$

$$\eta = \eta' \sqrt{1 - \left(\frac{fc}{f}\right)^2}$$

$fc = \frac{u'}{2} \sqrt{\left(\frac{m}{a}\right)^2 + \left(\frac{n}{b}\right)^2}$	$\lambda_c = \frac{u'}{fc}$ $\eta' = \sqrt{\frac{\mu}{\epsilon_e}}$	$\beta = \beta' \sqrt{1 - \left(\frac{fc}{f}\right)^2}$ $\beta' = \frac{\omega}{u'}; u' = \frac{1}{\sqrt{\mu\epsilon_e}}$
$h^2 = \left(\frac{m\pi}{a}\right)^2 + \left(\frac{n\pi}{b}\right)^2$		
$u_p = \omega/\beta = f\lambda$		