

TM Dalgalar (E dalgaları)

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Transvers Manyetik

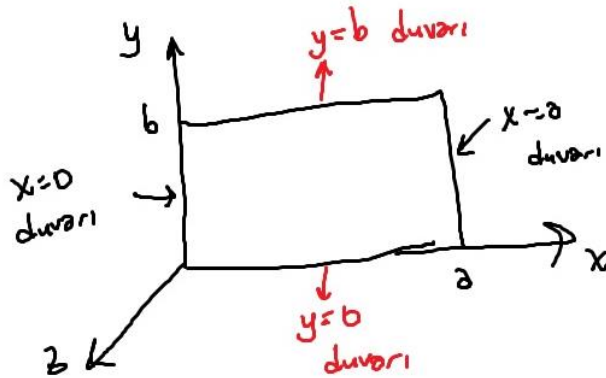
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 $H_z = 0$ ancak $E_z \neq 0$

$$\nabla_t^2 E_z + k_c^2 E_z = 0$$

$$E_z(x,y) = f(x)g(y)$$

$$f(x) = A_1 \cos k_x x + A_2 \sin k_x x$$

$$g(y) = B_1 \cos k_y y + B_2 \sin k_y y$$



İki ortam sınırında

$$\vec{E}_{t1} = \vec{E}_{t2}$$

$x=0$ duvarlarında

$$E_z = 0$$

$$\vec{E}_{t1} = \vec{E}_{t2}$$

metalik duvarın içinde $\vec{E} = 0$

$$E_z(x,y) = f(x)g(y) = [A_1 \cos(k_x x) + A_2 \sin(k_x x)] \underbrace{[B_1 \cos(k_y y) + B_2 \sin(k_y y)]}_{\Delta}$$

$$E_z(x,y) \Big|_{x=0} = [A_1 \overbrace{\cos(0)}^1 + A_2 \cancel{\sin(0)}] \Delta = 0$$

$$A_1 \Delta = 0 \Rightarrow A_1 = 0$$

$$E_z(x,y) \Big|_{x=a} = A_2 \underbrace{\sin(k_x a)} \cdot \Delta = 0$$

$$k_x a = \cancel{\pi}, 2\pi, 3\pi, \dots \quad k_x = \frac{n\pi}{a} \quad n=1, 2, \dots$$

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şükâr çözümler

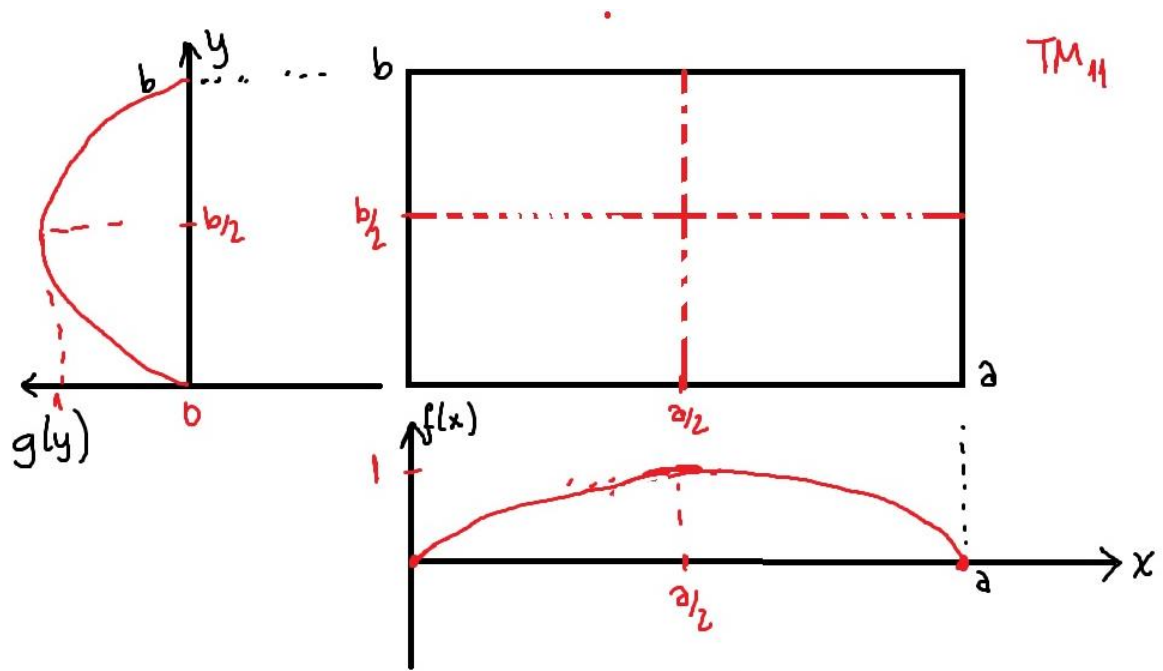
$y = \frac{0}{b}$ duvarlarında $E_z = 0$

$$E_z(x,y) \Big|_{y=0} = 0 \Rightarrow B_1 = 0$$

$$E_z(x,y) \Big|_{y=b} = 0 \Rightarrow B_2 \underbrace{\sin(k_y b)} = 0 \quad k_y = \frac{m\pi}{b} \quad n=1, 2, \dots$$

$$k_y b = \pi, 2\pi, 3\pi, \dots$$

$$E_z(x,y) = A_2 B_2 \sin\left(\frac{n\pi x}{a}\right) \sin\left(\frac{m\pi y}{b}\right) \quad \begin{matrix} n=1, 2, \dots \\ m=1, 2, \dots \end{matrix}$$



$$E_z(x,y) = A_{nm} \sin\left(\frac{n\pi x}{a}\right) \sin\left(\frac{m\pi y}{b}\right)$$

$$\text{TM}_{11} \text{ için } E_z(x,y) = A_{11} \underbrace{\sin\left(\frac{\pi x}{a}\right)}_{f(x)} \underbrace{\sin\left(\frac{\pi y}{b}\right)}_{g(y)}$$

