$$\nabla \times \underline{H} = \underline{J} + j\omega \underline{D} = \sigma \underline{E} + j\omega\epsilon \underline{E}$$
$$= (\sigma + j\omega\epsilon)\underline{E}$$

$$\nabla \times \underline{E} = -j\omega \underline{B} = -j\omega\mu \underline{H}$$

$\sigma = \sigma(\omega)$ - (blz 57)
$\epsilon = \epsilon(\omega)$ - (blz 62)
$\mu = \mu(\omega)$ - (blz 62)

$$\frac{-\partial H_y}{\partial z} = (\sigma + j\omega\epsilon) E_x \qquad \frac{\partial E_y}{\partial z} = j\omega\mu H_x$$

$$\frac{\partial H_x}{\partial z} = (\sigma + j\omega\epsilon) E_y \qquad \frac{\partial E_x}{\partial z} = -j\omega\mu H_y$$

Gekoppeld zijn:

$$\frac{\partial E_y}{\partial z} = j\omega\mu H_x \qquad \frac{\partial E_x}{\partial z} = -j\omega\mu H_y$$

$$\frac{\partial H_x}{\partial z} = (\sigma + j\omega\epsilon) E_y \qquad \frac{-\partial H_y}{\partial z} = (\sigma + j\omega\epsilon) E_x$$

$$\frac{\partial(\partial E_y)}{\partial z\,\partial z} = \frac{\partial\, j\omega\mu H_x}{\partial z} = j\omega\mu \frac{\partial H_x}{\partial z} = j\omega\mu(\sigma + j\omega\epsilon) E_y$$

$$\frac{\partial^2 E_y}{\partial z^2} = \underbrace{j\omega\mu(\sigma + j\omega\epsilon)} E_y$$

↳ [redacted] $h = \gamma^2 = (\alpha + j\beta)^2$

$$h = -\underline{\omega}\left(\mathrm{Re}(\mu)\,\mathrm{Im}(\sigma) + \underline{\omega}\,\mathrm{Re}(\mu)\,\mathrm{Re}(\epsilon) + \mathrm{Im}(\mu)\cdot\left(\mathrm{Re}(\sigma) - \underline{\omega}\,\mathrm{Im}(\epsilon)\right)\right)$$

$$-j\underline{\omega}\left(\mathrm{Im}(\mu)\,\mathrm{Im}(\sigma) - \mathrm{Re}(\mu)\,\mathrm{Re}(\sigma) + \mathrm{Im}(\mu)\,\mathrm{Re}(\epsilon)\underline{\omega} + \mathrm{Im}(\epsilon)\,\mathrm{Re}(\mu)\,\underline{\omega}\right)$$

$$h = -\omega\left(\rho_1 + j\rho_2\right)$$

$$\boxed{\frac{\partial^2 E_y}{\partial z^2} + \omega(\rho_1 + j\rho_2)E_y = 0}$$

$$\hookrightarrow \cancel{\triangleq k^2 = \gamma^2} = (\alpha + j\beta)^2$$

α is bepalend voor skineffect.

Exponential notation
$$E_y = E_{y0}\, e^{-\alpha z} \cos(\omega t - \beta z)$$

$$\alpha = \frac{1}{2}\sqrt{2\mu\omega}\sqrt{\sqrt{\omega^2\epsilon^2 + \sigma^2} - \omega\epsilon}$$

skindiepte @ e^{-1} ofwel $\alpha z = 1 \Rightarrow z = \frac{1}{\alpha}$

$$\delta_{skin} = \frac{\sqrt{2}}{\sqrt{\mu\omega}\sqrt{\sqrt{\omega^2\epsilon^2 + \sigma^2} - \epsilon\omega}} \quad [m]$$