

$$\mathbf{H} = \hat{\mathbf{x}} 50 \sin(2\pi \times 10^7 t - ky) \quad (\text{mA/m})$$

$$S_{av} = ?$$

$$\vec{S}_{av} = \frac{1}{2} \Re[\tilde{\mathbf{E}} \times \tilde{\mathbf{H}}^*]$$

$$\tilde{\mathbf{H}} = \frac{1}{\eta} \hat{\mathbf{k}} \times \tilde{\mathbf{E}}$$

$$\tilde{\mathbf{E}} = -\eta \hat{\mathbf{k}} \times \tilde{\mathbf{H}}$$

Solution:

$$\mathbf{E} = -\eta_0 \hat{\mathbf{y}} \times \mathbf{H} = \hat{\mathbf{z}} \eta_0 50 \sin(2\pi \times 10^7 t - ky) \quad (\text{mV/m}),$$

$$S_{av} = (\hat{\mathbf{z}} \times \hat{\mathbf{x}}) \frac{\eta_0 (50)^2}{2} \times 10^{-6} = \hat{\mathbf{y}} \frac{120\pi}{2} (50)^2 \times 10^{-6} = \hat{\mathbf{y}} 0.48 \quad (\text{W/m}^2).$$