

§ 4.5 时谐电磁场

练习 已知正弦电磁场的电场复矢量为

$$\vec{E}(z) = \vec{e}_x [Ae^{-j\frac{\pi}{2}} + Be^{-j\frac{\pi}{3}}] e^{-jkz}$$

求磁场的复矢量和瞬时值。（ μ 、 A 、 B 为常数）

$$\vec{H}(z) = \frac{j}{\omega\mu} \nabla \times \vec{E}(z) = \vec{e}_y \frac{k}{\omega\mu} [Ae^{-j\frac{\pi}{2}} + Be^{-j\frac{\pi}{3}}] e^{-jkz}$$

$$\vec{H}(z, t) = \text{Re}[\vec{H}(z) e^{j\omega t}] = \vec{e}_y \frac{k}{\omega\mu} \text{Re} \left\{ [Ae^{-j\frac{\pi}{2}} + Be^{-j\frac{\pi}{3}}] e^{-jkz} e^{j\omega t} \right\}$$

$$= \vec{e}_y \frac{kA}{\omega\mu} \text{Re} \left\{ e^{j\omega t - jkz - j\frac{\pi}{2}} \right\} + \vec{e}_y \frac{kB}{\omega\mu} \text{Re} \left\{ e^{j\omega t - jkz - j\frac{\pi}{3}} \right\}$$

$$= \vec{e}_y \frac{kA}{\omega\mu} \cos \left(\omega t - kz - \frac{\pi}{2} \right) + \vec{e}_y \frac{kB}{\omega\mu} \cos \left(\omega t - kz - \frac{\pi}{3} \right)$$