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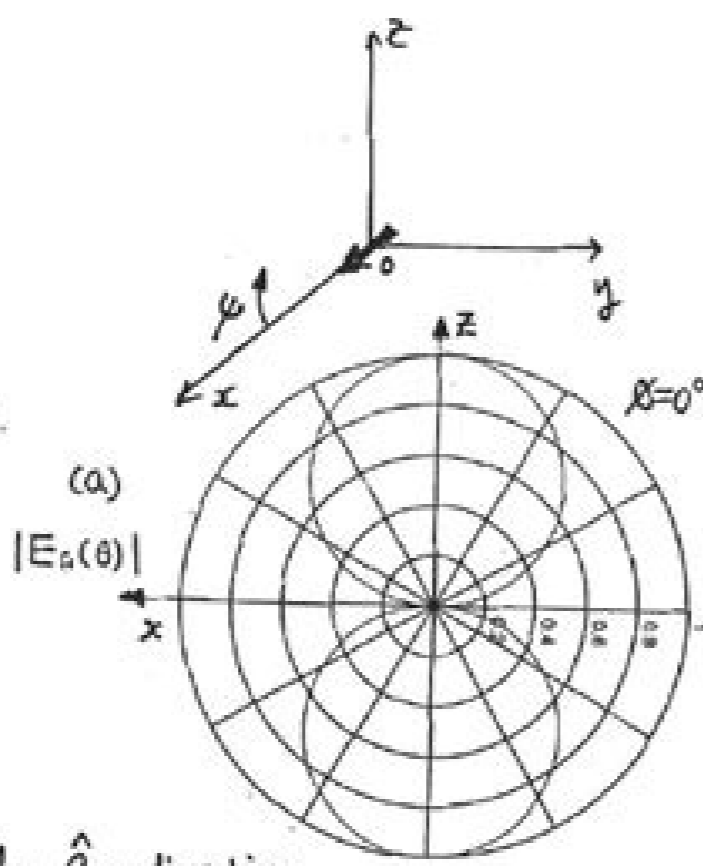
- 4.3. For Problem 4.1 determine the polarization of the radiated far-zone electric fields (E_θ , E_ϕ) and normalized amplitude pattern in the following planes:
- $\phi = 0^\circ$
 - $\phi = 90^\circ$
 - $\theta = 90^\circ$

4-3. a. $\phi = 0^\circ$; (x-z plane)

$$E_\psi = j\eta \frac{kI_0 l e^{jkr}}{4\pi r} \sqrt{1 - \sin^2 \theta}$$

$$\approx j\eta \frac{kI_0 l e^{jkr}}{4\pi r} \cos \theta$$

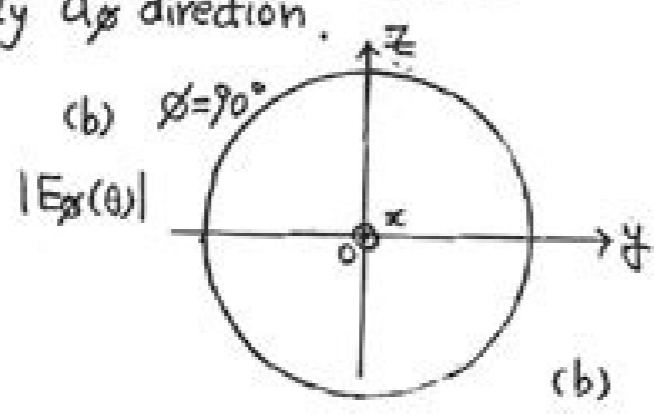
At $\phi = 0^\circ$, E_ψ has only \hat{a}_θ direction.
 $E_\psi \sim E_\theta$ polarization



b. $\phi = 90^\circ$ (y-z plane)

$$E_\psi \approx j\eta \frac{kI_0 l e^{jkr}}{4\pi r} 1$$

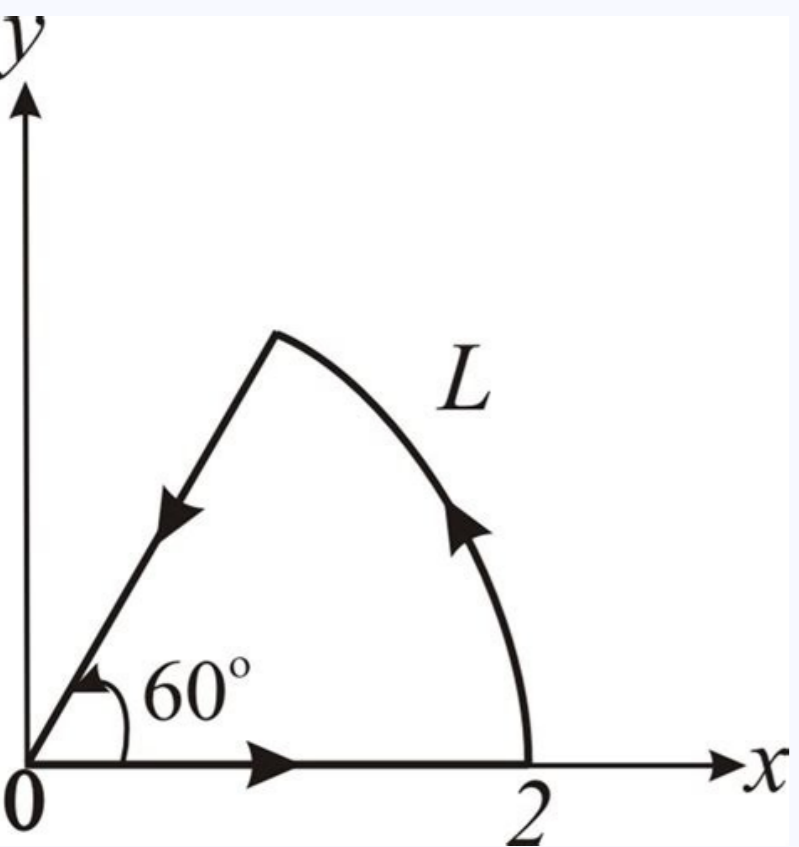
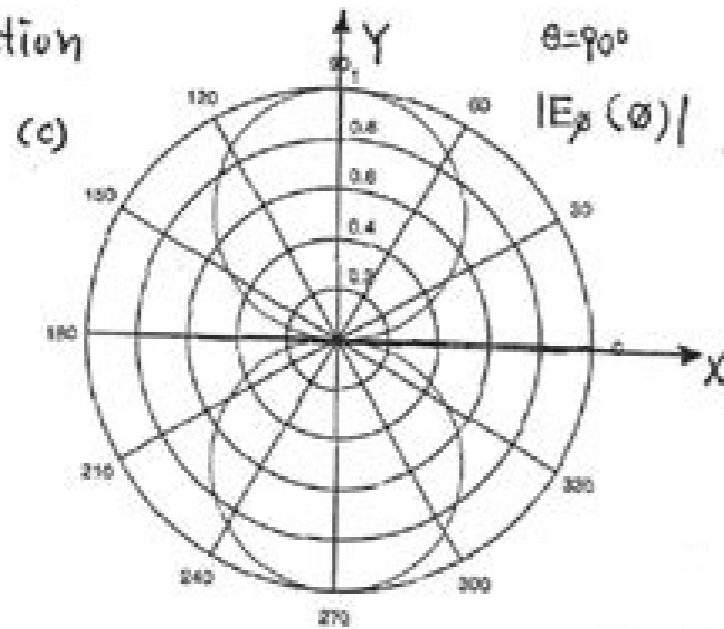
At $\phi = 90^\circ$, (y-z plane), E_ψ has only \hat{a}_ϕ direction.
 $E_\psi \sim E_\phi$ polarization



c. $\theta = 90^\circ$ (x-y plane)

$$E_\psi = j\eta \frac{kI_0 l e^{jkr}}{4\pi r} \sqrt{1 - \cos^2 \phi} = j\eta \frac{kI_0 l e^{jkr}}{4\pi r} \sin \phi$$

At $\theta = 90^\circ$, (x, y), E_ψ has only \hat{a}_ϕ direction.
 $E_\psi \sim E_\phi$ polarization



Interactive e-Text
 Engineering Electromagnetics
 Sixth Edition
 William H. Hayt, Jr., John A. Buck

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