

Problem 7.14 Plot the locus of $\mathbf{E}(0, t)$ for a plane wave with

$$\mathbf{E}(z, t) = \hat{\mathbf{x}} \sin(\omega t + kz) + \hat{\mathbf{y}} 2 \cos(\omega t + kz)$$

Determine the polarization state from your plot.

Solution:

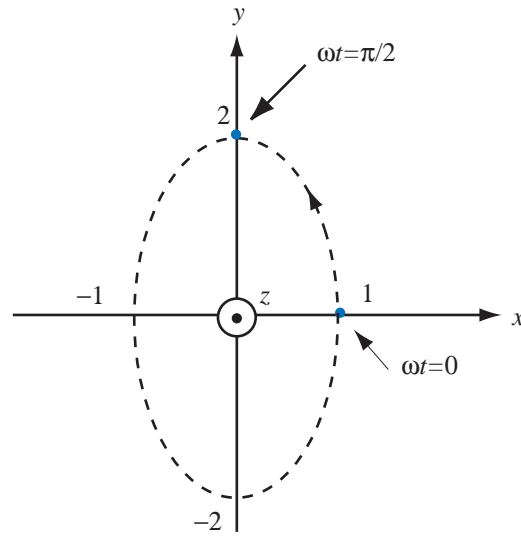


Figure P7.14: Locus of \mathbf{E} versus time.

$$\mathbf{E} = \hat{\mathbf{x}} \sin(\omega t + kz) + \hat{\mathbf{y}} 2 \cos(\omega t + kz).$$

Wave direction is $-\hat{\mathbf{z}}$. At $z = 0$,

$$\mathbf{E} = \hat{\mathbf{x}} \sin \omega t + \hat{\mathbf{y}} 2 \cos \omega t.$$

Tip of \mathbf{E} rotates in accordance with right hand (with thumb pointing along $-\hat{\mathbf{z}}$). Hence, wave state is RHE.
