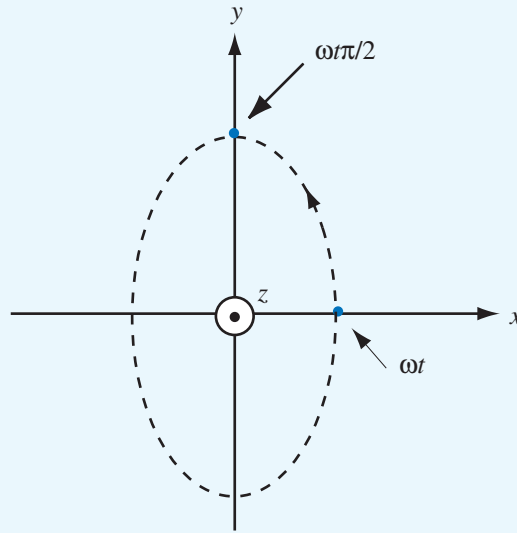


**7.16** Plot the locus of  $\mathbf{E}(0,t)$  for a plane wave with

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

Determine the polarization state from your plot.

**Solution:**



**Figure P7.16** 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.

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