

Polarization and Propagation Direction

Reading assignment

Paul, Whites, and Nasar, 6.5, 6.6, 6.8.1

Problem 1 - polarization

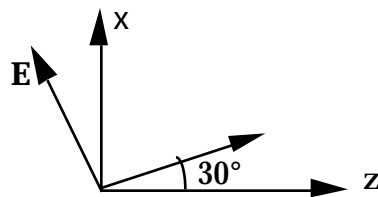
Consider a wave travelling in the z direction whose electric field is given by $\mathbf{E}(z,t) = 3 \cos(\omega t - kz) \mathbf{a}_x + C \cos(\omega t - kz + \phi) \mathbf{a}_y$. Describe the polarization (e.g. linear, right circular, etc.) and on an xy plot sketch the locus of $\mathbf{E}(0,t)$ over a cycle for the following cases.

a) $C = 4 \text{ V/m}$, $\phi = 0^\circ$

b) $C = 3 \text{ V/m}$, $\phi = 45^\circ$

Problem 2 - Arbitrary propagation angle

The direction of \mathbf{E} and \mathbf{H} of an electromagnetic wave with $\lambda = 500 \text{ nm}$ are shown below. The wave is traveling through air. The electric field has a magnitude of 30 V/m . What are the \mathbf{E} and \mathbf{H} phasors?



y axis is out of the page