

Electromagnetic Waves

Homework #1 (Due Time - Oct. 8, '13 - 11:30 a.m.)

"It's a beginning... Beginning of the end..."

1-) Find phasor forms of the following electromagnetic waves.

- a) $u(z, t) = 5\cos(2\pi 100z - wt)$ b) $u(y, t) = 0.5\cos(\pi 1000y - wt)$
c) $u(z, x, t) = \sin(2\pi z + 2x - wt)$ d) $u(t) = \cos(wt)$
e) $u(x, z, t) = 2\cos(2\pi z + 2\pi x + wt)$ f) $u(x, t) = \sin(2\pi x + wt)$
g) $u(x, z, t) = 5\cos(wt) + \sin(wt) + \sin(wt + kx)$
h) $u(x, z, t) = \sin(wt + 2x) * \cos(wt - 2z)$

2-) Find the amplitude, direction of propagation and phase velocity of the following waves.

- a) $u(z, t) = 5\cos(2\pi 100z - wt)$ b) $u(y, t) = 5\cos(\pi y - wt)$
c) $u(z, x, t) = -\sin(2\pi z + 2x + wt)$ d) $u(x, t) = \cos(wt) \cdot \sin(kx)$
e) $u(x, z, t) = 2\cos(2\pi z + 2\pi x + wt)$ f) $u(x, t) = \sin(2\pi x + wt)$
g) $u(x, z, t) = 5\cos(wt) + \sin(wt) + \sin(wt + kx)$
h) $u(x, z, t) = \sin(wt + 2x) * \cos(wt - 2z)$

3-) Examine the following waves and decide whether they are electromagnetic waves or not. Explain your answers shortly.

- a) $u(t) = \cos(wt)$ b) $u(x) = \cos(kx)$
c) $u(x, t) = \ln(x + t)$ d) $u(x, y, z, t) = \cos(2x + y - z - t)$
e) $u(x, z, t) = \cos(zx + wt)$ f) $u(x, t) = \sin(x + wt)$
g) $u(x, z, t) = \cos(wt) \sin(kx)$
h) $u(x, z, t) = \sin(wt + 2x) * \cos(wt - 2z)$