Electromagnetic Waves in Lossy Media

Reading assignment

Paul, Whites, and Nasar, 6.3, 6.4

Problem 1 - Lossy media parameters

Find α, β, λ and η of an electromagnetic wave traveling through seawater ($\varepsilon_r = 72$, $\sigma = 4\ S/m$) at 10 MHz and 100 GHz.

Problem 2 - Energy & Power - lossy media

A 10 MHz wave that is polarized in the x direction propagates in the +z direction in seawater. At z=0, it has a power density of $10\ W/m^2$ (Use the results of Problem 1).

a. Write the electric and magnetic fields in phasor form.

b. Write the electric field in time domain form.

c. At what value of z will the power density of the wave be 1% of its initial power?