

Electromagnetic Waves in Lossy Media

Reading assignment

Ulaby, 7-4, 7-6.2

Connor and Salon, Unit IX

Problem 1 - Lossy media parameters

Find α , β , λ and η of an electromagnetic wave traveling through seawater ($\epsilon_r = 72$, $\sigma = 4$ 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?