

## Electromagnetic Waves in Lossy Media

**Reading assignment**

Ulaby, 7-4, 7-6.2

Connor and Salon, Unit IX

**Problem 1 - Lossy media parameters**

Find  $\alpha$ ,  $\beta$ ,  $\lambda$  and  $\eta$  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  $10 \text{ W/m}^2$  (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?