

## Wave Properties &amp; Phasors

**Reading assignment**

Ulaby, 1-3, 1-4, 1-5, 1-6

**Problem 1 - Wave parameters**

Run lesson1\_5.m using Matlab. If the file isn't on your computer, copy it from the server to your c:\Field+Wave directory. The program plots  $\cos(\omega t - \beta z)$  at fixed  $z$  on the top and fixed  $t$  on the bottom. Vary the values for  $\omega$  and  $\beta$ .

- What does  $\omega$  represent? (Use the graph at fixed  $z$ . Express in terms of the wave period).
- What does  $\beta$  represent? (Use the graph at fixed  $t$ . Express in terms of the wavelength,  $\lambda$ ).
- What is the velocity of the wave? (Express in terms of  $\omega$  and  $\beta$ ).

**Problem 2 - Phasors**

- Convert the following from time domain form to phasor form.

$$V = 2 \cos(4t+2)$$

$$I = 8 \sin(3t)$$

$$V = 2 \cos(4t - 6z + 2)$$

$$\mathbf{H} = 5 \cos(7t - z + 0.3) \mathbf{a}_y.$$

- Convert the following from phasor form to time domain form. Assume the frequency is 3 Hz.

$$\hat{V} = 3.3 \exp(j 5)$$

$$\hat{I} = 4 \exp(j (5 - 3z))$$

$$\hat{E} = 6.9 \exp(-j 0.3 z) \mathbf{a}_x.$$