Wave Properties & Phasors

Reading assignment

Popović and Popović, 19.5

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 ω and β.

a. What does ω represent? (Use the graph at fixed z. Express in terms of the wave period).

b. What does β represent? (Use the graph at fixed t. Express in terms of the wavelength, λ).

c. What is the velocity of the wave? (Express in terms of ω and β).

Problem 2 - Phasors

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

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

$I = 8\sin(3t)$

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

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

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

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

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

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