|  |  |  |
| --- | --- | --- |
| **Benha University****Faculty of Engineering at Shoubra****Electrical Engineering Department** | **she3ar** | **Microwave fundamentals****3rd Year Communications****(2013-2014)** |

**Sheet1**

$$ Starting from the transmission line model, derive an equation for the attenuation constant and phase constant of transmission line in terms of R, L, C, G.

$$ Use the telegrapher equation, and general solution of wave equation to derive an equation for the characteristic impedance of transmission line.

$$ The current on a transmission line is given as i (t) =1.2Cos (1.51×1010*t*-80.3*z*) A.

 Determine (a) the frequency, (b) the wavelength, (c) the phase velocity, and

 (d) The phasor representation of this current.

$$ A transmission line has the following per unit length parameters: L=0.2µH/m, C=300pF/m, R=5Ω/m and G=0.01S/m. Calculate the propagation constant and the characteristic impedance of this line at 500MHz. Recalculate these quantities in the absence of loss (R=G=0).

$$ RD-402U semi-rigid coaxial cable has an inner conductor diameter of 0.91 mm, and a dielectric diameter (equal to the inner diameter of the outer conductor) of 3.02 mm. Both conductors are copper and the dielectric material is Teflon. Compute the R, L, G, and C parameters of this line at 1 GHz, and use these results to find the characteristic impedance and attenuation of the line at 1 GHz.

Given: Teflon relative permittivity=2.08bcopper conductivity σ=5.813X107 s/m, surface resistivity Rs= (𝝎𝝁/2σ).5

**REPORT**

$$ The characteristic impedance of a certain lossless transmission line is 72 Ω. If

 L = 0.5µH / m, Find C, νph and β If f = 80MHz.

**Good Luck**

**Dr. Gehan Sami**