

EEL 3472  
HOMEWORK #2  
DUE FRIDAY, JANUARY 23, 2009

1. Ulaby, page 49. Answer Review Questions Q 2.1 – Q 2.4
2. Ulaby, Page 100, Problem 2.1
3. Given the two telegrapher's equations in the time domain for the lossless case ( $R'=G'=0$ ), derive the wave equation for  $v(z,t)$  in the time domain. Show that  $v(z,t) = A \cos \omega(t - \sqrt{L'C'} z - \phi_0)$ , is a solution (as you know, any function of  $(t \pm \sqrt{L'C'} z$  is a solution). Use either of the telegrapher's equations to show that for the  $v(z,t)$  above, that is, a time-domain wave traveling in the positive  $z$  - direction,  $v(z,t) / i(z,t) = \sqrt{L' / C'}$ .
4. For the phasor case we found transmission line solutions.

$$\tilde{V}(z) = V_0^+ e^{-\gamma z} + V_0^- e^{+\gamma z}$$

$$\tilde{I}(z) = I_0^+ e^{-\gamma z} + I_0^- e^{+\gamma z}$$

Show in detail that  $\frac{V_0^-}{I_0^-} = -Z_0$  whereas  $\frac{V_0^+}{I_0^+} = +Z_0$