

## **EE 481/581 Microwave Engineering (Fall 2025)**

### **Laboratory 2 Lossy Transmission Lines- Part 1**

#### **Background**

For this lab, you will begin studying a lossy coaxial transmission line (TL) by estimating some key parameters using information from the text, internet, and TL datasheet. Document all work and results in logbook.

#### **Preliminary**

- 1) Visit instructor to physically examine cable, i.e., lossy coaxial TL with connectors. Record relevant information in logbook, e.g., manufacturer and model number.
- 2) Find relevant datasheet(s) for cable and insert in logbook. Cite sources.
- 3) Using the datasheet(s), determine the nominal characteristic impedance  $Z_0$ .
- 4) Estimate the nominal phase velocity  $v_p$  based on the most accurate information available from the datasheet(s), text, and/or internet. Give citations, show all work, and detail any assumptions, approximations ...
- 5) Estimate the attenuation constant  $\alpha$  (dB/m and Np/m), phase constant  $\beta$  (rad/m), and propagation constant  $\gamma$  (m<sup>-1</sup>) at 1, 2, 4, 6, & 8 GHz. Give citations, show all work, and detail any assumptions, approximations ... Tabulate results. Format: col. 1 frequency, col. 2  $\alpha$  (dB/m), col. 3  $\alpha$  (Np/m), col. 4  $\beta$  (rad/m), and col. 5  $\gamma$  (1/m). [Hint: Assume a low-loss TL at room temperature with  $Z_0$  and  $v_p$  that are constant.]
- 6) Next, estimate the per-unit-length parameters  $R$ ,  $L$ ,  $G$ , and  $C$  at 1, 2, 4, 6, & 8 GHz. Give citations, show all work, and detail any assumptions, approximations ... Tabulate results. Format: col. 1 frequency, col. 2  $R$  ( $\Omega$ /m), col. 3  $L$  (nH/m), col. 4  $G$  (mS/m), and col. 5  $C$  (pF/m). [Hint: Assume a low-loss TL at room temperature with  $Z_0$  and  $v_p$  that are constant. Consider equations for  $\gamma$  and  $Z_0$ .]
- 7) Summarize and comment on significant results.

**Logbook and short report due Monday, September 29, 2025 by 4 pm at office (EEP 314)  
or EECS mailbox.**