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CLASSMATE

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UG. SEM-IV Unit-05 paper-06.

→ Wave Equation and propagation Constant.

Taking Second derivative.

$$\frac{\partial^2 V}{\partial x^2} = \gamma^2 V$$

Where

$$\gamma = \sqrt{(R + j\omega L)(G + j\omega C)}$$

$$\Rightarrow \gamma = \alpha + j\beta$$

• α = attenuation constant.

• β = phase constant.

For lossless line ($R=0, G=0$)

$$\gamma = j\omega\sqrt{LC}$$

Wave velocity

$$v = \frac{1}{\sqrt{LC}}$$

→ Characteristic Impedance.

$$Z_0 = \sqrt{\frac{R + j\omega L}{G + j\omega C}}$$

For lossless line:

$$Z_0 = \sqrt{\frac{L}{C}}$$

It is the impedance seen looking into an infinitely long line.

→ Reflection Coefficient: When a wave travels along a transmission line and reaches the load end.

- If Load impedance $Z_L = Z_0$, wave fully absorbed and it has no reflection.
- If $Z_L \neq Z_0$, part of wave reflects back and Reflection occurs.