

8.3 Transmission Line Propagation II

1. Solve 8.8f.

$$V = V_+ e^{-j\beta z} + V_+ |P| e^{j(\theta_P + \beta z)} =$$

$$= \operatorname{Re} \left[V_+ e^{j\omega t} e^{-j\beta z} + V_+ |P| e^{j\omega t} e^{j(\theta_P + \beta z)} \right] =$$

$$= \operatorname{Re} \left[V_+ e^{j(\omega t - \beta z)} + V_+ |P| e^{j(\omega t + \beta z)} \right] e^{j\theta_P} \Rightarrow$$

$$V = V_+ \cos(\omega t - \beta z) + V_+ |P| \cos(\omega t + \beta z) \quad \text{for } P > 0$$

and

$$V = V_+ \cos(\omega t - \beta z) + V_+ |P| \cos(\omega t + \beta z + \pi) \quad \text{for } P < 0$$

$$\text{in our case } P = \frac{1}{2} > 0$$

$$V = V_+ \cos(\omega t - \beta z) + V_+ |P| \cos(\omega t + \beta z).$$

$$\cos A \cos B = \frac{1}{2} [\cos(A+B) + \cos(A-B)] \Rightarrow$$

$$\cos(A-B) = 2 \cos A \cos B - \cos(A+B)$$

$$\cos(\omega t - \beta z) = 2 \cos(\omega t) \cos(\beta z) - \cos(\omega t + \beta z)$$

$$V = V_+ [2 \cos(\omega t) \cos(\beta z) - \cos(\omega t + \beta z)] + V_+ |P| \cos(\omega t + \beta z)$$

$$V = V_+ [2 \cos(\omega t) \cos(\beta z) + (|P| - 1) \cos(\omega t + \beta z)]$$