ECECS 611 Attenuation Constant

When a wave propagates in a lossy medium, the propagation constant is given by

= + j

Here is the attenuation constant and is the propagation constant. The ${\bf E}$ field can be written as

 $\mathbf{E} = \mathbf{E}_{\mathbf{o}} e^{-z} = \mathbf{E}_{\mathbf{o}} e^{-z} e^{-jz} = +j$

A similar expression can be written for the \mathbf{H} field. The time averaged power at any point z can be written as

$$\langle \mathbf{P} \rangle = \frac{1}{2} \operatorname{Re} (\mathbf{E} \mathbf{x} \mathbf{H}) \quad e^{-2} \mathbf{z}$$

Thus P e^{-2az} . Thus the total power at any point can be written as

$$P(z) = P_o e^{-2 z}$$

Here P_o is the power at z=0. The power loss per unit length can be written as

$$P_1 = -\frac{P}{Z} = 2 P$$

Solving for , we find

$$=\frac{P_1}{2P}$$

Therefore to find the attenuation constant, power loss per unit length and the total power flowing at that point should be evaluated.