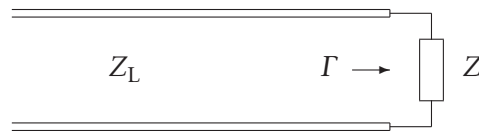


Description

These nomographs show several mismatch characteristics on one scale versus the linear scale of reflectivity $|\Gamma|$.

Consider an RF transmission line with characteristic impedance Z_L , which is terminated by the impedance Z .



The corresponding reflection coefficient is then

calculated by

$$\Gamma = \frac{z - 1}{z + 1},$$

where $z = Z/Z_L$. For a real impedance $Z = R$ the reflectivity Γ is also real and therefore $\Gamma = |\Gamma|$. In case of $\Gamma = 0$, that is to say $Z = Z_L$, maximum power P_{\max} is transmitted to the load and none is reflected (matched load). For $\Gamma \neq 0$ the maximum power ratio is given by

$$\frac{P}{P_{\max}} = 1 - |\Gamma|^2.$$

The same in decibels (dB) is calculated by

$$\frac{P/P_{\max}}{\text{dB}} = 10 \log(1 - |\Gamma|^2).$$

Given some reflectivity $|\Gamma|$, the corresponding voltage standing wave ratio (VSWR) is

$$s = \frac{1 + |\Gamma|}{1 - |\Gamma|},$$

which also describes the ripple of voltage and current magnitudes along the line since

$$s = \frac{U_{\max}}{U_{\min}} = \frac{I_{\max}}{I_{\min}}.$$

The reciprocal of s is called the matching coefficient m , which is also known as the inverse VSWR. You can easily get sorted out in your mind that for real-valued $Z = R$, s equals normalized impedance R/Z_L if $R \geq Z_L$ and m equals normalized impedance R/Z_L if $R \leq Z_L$.