18373038 钱思远

4-9

解：①

$\Gamma_1 = S_{11} = \frac{b_1}{a_1}\Big|_{a_2=0} = 0.6e^{j\frac{\pi}{2}}$

对称：

$S_{22} = 0.6e^{j\frac{\pi}{2}}$

无耗：

$|S_{21}| = |S_{12}| = \sqrt{1-|S_{11}|^2} = 0.8$.

$\theta_{12} = \theta_{21} = \frac{1}{2}(\theta_{11}+\theta_{22}+2n\pi \pm \pi)$

$= \frac{1}{2}[(2n+1)\pi \pm \pi]$

$= n\pi$ 或 $(n+1)\pi$

S为数矩阵：

$[S] = \begin{pmatrix} 0.6e^{j\frac{\pi}{2}} & 0.8e^{j\frac{\pi}{2}} \\ 0.8e^{j\frac{\pi}{2}} & 0.6e^{j\frac{\pi}{2}} \end{pmatrix}$

$[S] = \begin{pmatrix} 0.6j & 0.8 \\ 0.8 & 0.6j \end{pmatrix}$

或 $[S] = \begin{pmatrix} 0.6j & -0.8 \\ -0.8 & 0.6j \end{pmatrix}$

② $T = S_{21} = 0.8$ 或 -0.8.

$L = \frac{1}{|T|^2} = 1.5625$

$\phi = \arg(S_{21}) = 0$ 或 π.

$\rho = \frac{1+|\Gamma_1|}{1-|\Gamma_1|} = \frac{1+0.6}{1-0.6} = 4$

4-10

解：

$Z_{11} = \frac{\dot{U}_1}{\dot{I}_1}\Big|_{\dot{I}_2=0} = Z_A + Z_C$.

$Z_{22} = \frac{\dot{U}_2}{\dot{I}_2}\Big|_{\dot{I}_1=0} = Z_B + Z_C$

$Z_{12} = \frac{\dot{U}_1}{\dot{I}_2}\Big|_{\dot{I}_1=0} = Z_C$.

$Z_{21} = \frac{\dot{U}_2}{\dot{I}_1}\Big|_{\dot{I}_2=0} = Z_C$

$[Z] = \begin{pmatrix} Z_A+Z_C & Z_C \\ Z_C & Z_B+Z_C \end{pmatrix}$

4-11

解：电压传递系数：

$T = S_{21} = -0.98$.

插入衰减：

$L = \frac{1}{|S_{21}|^2} = 1.041$.

插入相除：

$\phi = \pi$.

驻入驻波比：

$\rho = \frac{1+|S_{11}|}{1-|S_{11}|} = 1.5$.

4-12

解：2 接匹配负载

$$|\Gamma_1| = \frac{\rho-1}{\rho+1} = 0.2.$$

$$\phi_1 = -\pi + 2\beta l_{min} = -\frac{\pi}{2}$$

$$\therefore S_{11} = |\Gamma_1| e^{j\phi_1} = -0.2j$$

对称：

$$S_{22} = S_{11} = -0.2j$$

无耗对称：

$$\theta_{12} = \theta_{21} = \frac{1}{2}(\theta_1 + \theta_2 + 2n\pi \pm \pi)$$

$$= n\pi \text{ 或 } (n-1)\pi.$$

$$|S_{12}| = |S_{21}| = \sqrt{1-|S_{11}|^2} = 0.98.$$

$$\therefore [S] = \begin{pmatrix} -0.2j & 0.98 \\ 0.98 & -0.2j \end{pmatrix}$$

或 $= \begin{pmatrix} -0.2j & -0.98 \\ -0.98 & -0.2j \end{pmatrix}$.