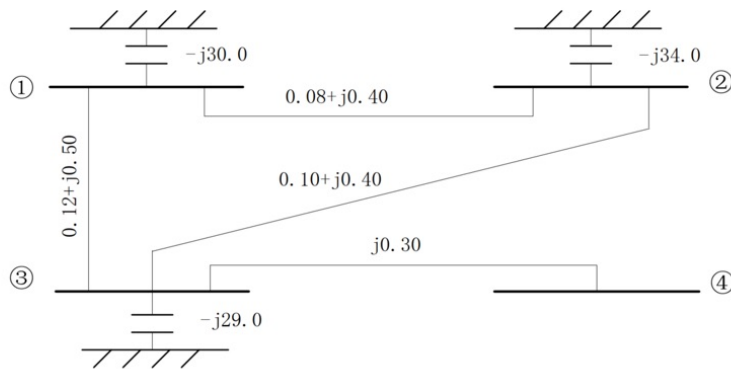


电力系统分析—作业6

1. 求下图所示系统的节点导纳矩阵（数字是阻抗的标么值）。



$$\textcircled{1} \quad Y_{11*} = \frac{1}{-j30} + \frac{1}{0.08+j0.4} + \frac{1}{0.12+j0.5} = 0.9346 - j4.262$$

$$Y_{12*} = -\frac{1}{0.08+j0.4} = -0.4808 + j2.404$$

$$Y_{13*} = -\frac{1}{0.12+j0.5} = -0.4539 + j1.891$$

$$Y_{14*} = 0$$

$$\textcircled{2} \quad Y_{21*} = Y_{12*} = -0.4808 + j2.404$$

$$Y_{22*} = \frac{1}{-j34} + \frac{1}{0.08+j0.4} + \frac{1}{0.1+j0.4} = 1.069 - j4.727$$

$$Y_{23*} = -\frac{1}{0.1+j0.4} = -0.588 - j2.353$$

$$Y_{24*} = 0$$

$$\textcircled{3} \quad Y_{31*} = Y_{13*} = -0.4539 + j1.891$$

$$Y_{32*} = Y_{23*} = -0.588 - j2.353$$

$$Y_{33*} = \frac{1}{-j29} + \frac{1}{0.12+j0.5} + \frac{1}{0.1+j0.4} + \frac{1}{j0.3} = 1.042 - j7.543$$

$$Y_{34*} = -\frac{1}{j0.3} = j3.333$$

$$\textcircled{4} \quad Y_{41*} = Y_{14*} = 0$$

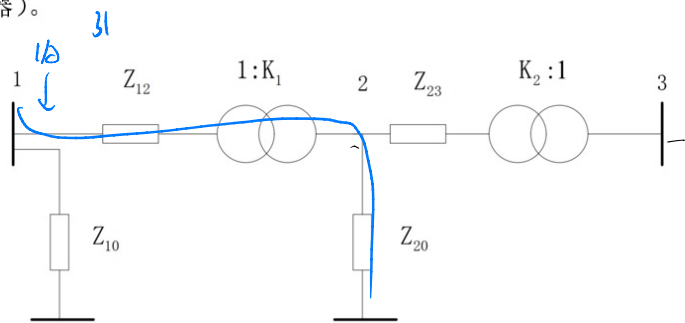
$$Y_{42*} = Y_{24*} = 0$$

$$Y_{43*} = Y_{34*} = j3.333$$

$$Y_{44*} = \frac{1}{j0.3} = -j3.333$$

$$Y_{*} = \begin{bmatrix} 0.9346 - j4.262 & -0.4808 + j2.404 & -0.4539 + j1.891 & 0 \\ -0.4808 + j2.404 & 1.069 - j4.727 & -0.588 - j2.353 & 0 \\ -0.4539 + j1.891 & -0.588 - j2.353 & 1.042 - j7.543 & j3.333 \\ 0 & 0 & j3.333 & -j3.333 \end{bmatrix}$$

2. 用定义法求下图网络所对应节点阻抗矩阵中的元素 $Z_{22}, Z_{33}, Z_{12}, Z_{31}$ (变压器为理想变压器)。



$$Z_{22} = Z_{20} \parallel [K_1^2 (Z_{23} + Z_{20})] = \frac{K_1^2 Z_{20} (Z_{23} + Z_{20})}{Z_{20} + K_1^2 (Z_{23} + Z_{20})}$$

$$Z_{12} = \frac{Z_{22}}{K_1} \cdot \frac{Z_{10}}{Z_{10} + Z_{12}} = \frac{K_1 Z_{10} Z_{22}}{Z_{10} + K_1^2 (Z_{23} + Z_{20})}$$

$$Z_{33} = \frac{Z_{22}}{K_1^2} + \frac{Z_{23}}{K_2^2} = \frac{1}{K_1^2} \left[Z_{22} + \frac{K_1 Z_{10} Z_{20}}{Z_{10} + K_1^2 (Z_{23} + Z_{20})} \right]$$

$$Z_{31} = \frac{Z_{21}}{K_2} = \frac{K_1 Z_{10} Z_{20}}{K_2 [Z_{10} + K_1^2 (Z_{23} + Z_{20})]}$$

3. 已知一网络的节点导纳矩阵上三角部分如下图(左)所示, 试将下图(右)中节点1-4之间联接成相应网络, 并标明各支路导纳值。

1	2	3	4
$-j20$	$j9$	$j8$	$j7$
	$-j6$	0	0
		$-j6$	0
			$-j6$

1

3

4

