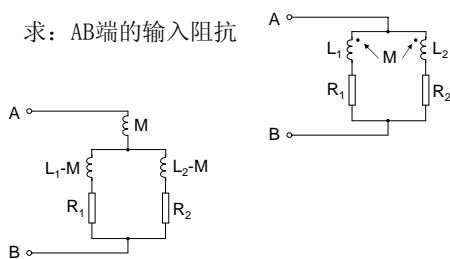


例10-1 求：AB端的输入阻抗

解：

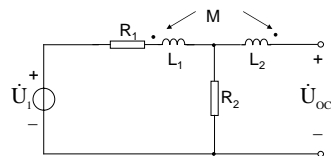


$$Z_i = j\omega M + \frac{[R_1 + j\omega(L_1 - M)][R_2 + j\omega(L_2 - M)]}{R_1 + R_2 + j\omega(L_1 + L_2 - 2M)}$$

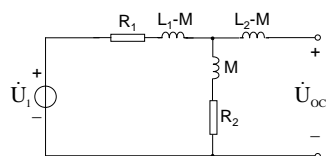
1

例10-2

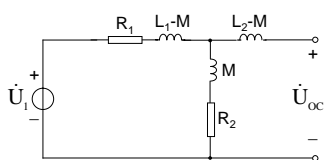
求开路电压  $\dot{U}_{oc}$



解：法1



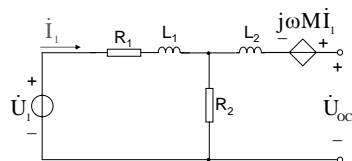
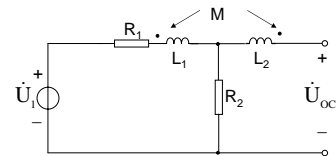
2



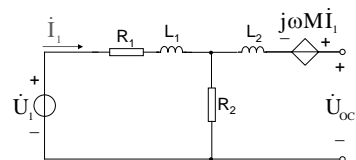
$$\begin{aligned} \dot{U}_{oc} &= \frac{\dot{U}_1(R_2 + j\omega M)}{R_1 + R_2 + j\omega(L_1 - M + M)} \\ &= \frac{\dot{U}_1(R_2 + j\omega M)}{R_1 + R_2 + j\omega L_1} \end{aligned}$$

3

法2



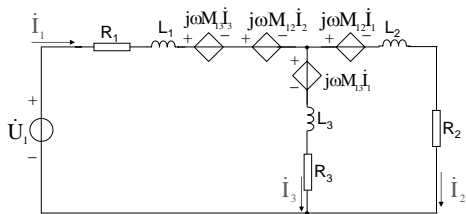
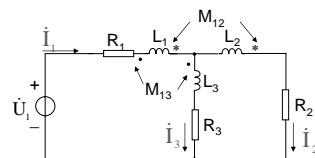
4



$$\begin{aligned} \dot{U}_{oc} &= j\omega M \dot{I}_1 + R_2 \dot{I}_1 \\ &= (R_2 + j\omega M) \dot{I}_1 \\ &= (R_2 + j\omega M) \frac{\dot{U}_1}{R_1 + R_2 + j\omega L_1} \end{aligned}$$

5

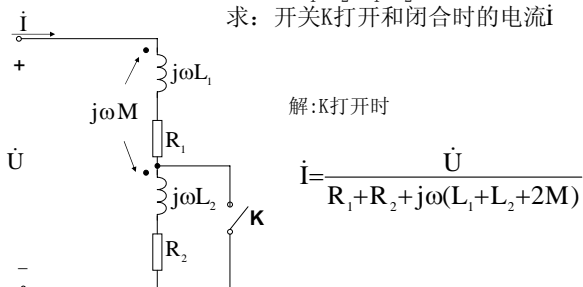
例10-3 列支路法方程



6

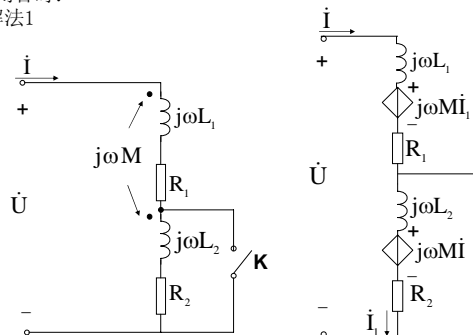
例10-4

已知:  $R_1, R_2, L_1, L_2, M, U, \omega$   
求: 开关K打开和闭合时的电流 $\dot{I}$



7

K闭合时:  
解法1

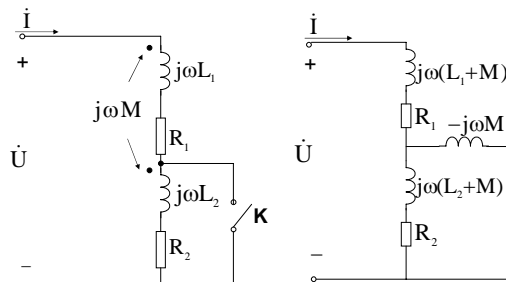


8

$$\begin{aligned} \dot{U} &= (R_1 + j\omega L_1)\dot{I} + j\omega M\dot{I}_1 \\ (R_2 + j\omega L_2)\dot{I}_1 + j\omega M\dot{I} &= 0 \\ \dot{I}_1 &= \frac{-j\omega M\dot{I}}{R_2 + j\omega L_2} \\ \dot{U} &= (R_1 + j\omega L_1)\dot{I} + \frac{\omega^2 M^2}{R_2 + j\omega L_2}\dot{I} \\ \dot{I} &= \frac{\dot{U}}{R_1 + j\omega L_1 + \frac{\omega^2 M^2}{R_2 + j\omega L_2}} \end{aligned}$$

9

解法2

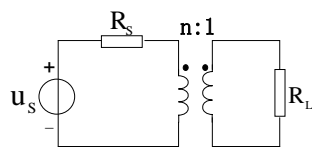


10

$$\begin{aligned} Z &= R_1 + j\omega(L_1 + M) + \frac{[R_2 + j\omega(L_2 + M)](-j\omega M)}{R_2 + j\omega(L_2 + M) - j\omega M} \\ \dot{I} &= \frac{\dot{U}}{Z} \end{aligned}$$

11

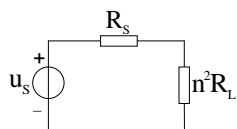
例10-5



已知:  $R_s = 10\text{K}\Omega, R_L = 10\Omega$   
若使负载 $R_L$ 能从电源获得最大功率  
求: 理想变压器变比 $n$ 。

12

解:

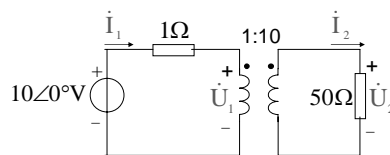


$$n^2 R_L = R_s$$

$$n = \sqrt{\frac{R_s}{R_L}} = \sqrt{\frac{10 \times 10^3}{10}} = 31.6$$

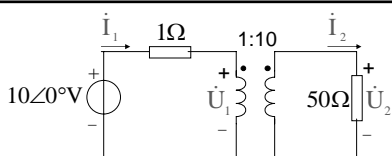
13

例10-6 求:  $\dot{U}_2$



14

解法1

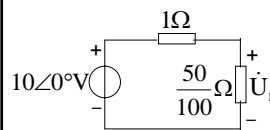
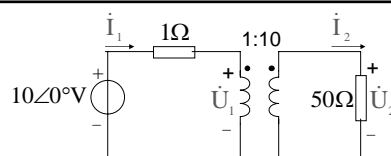


$$\begin{cases} 1\dot{I}_1 + \dot{U}_1 = 10\angle 0^\circ \\ 50\dot{I}_2 = \dot{U}_2 \\ \frac{\dot{U}_1}{\dot{U}_2} = \frac{1}{10} \\ \frac{\dot{I}_1}{\dot{I}_2} = 10 \end{cases}$$

联立解出  $\dot{U}_2 = \frac{100}{3} \angle 0^\circ \text{V}$

15

解法2



$$\dot{U}_1 = \frac{10\angle 0^\circ}{1+0.5} \times 0.5 = 3.33\angle 0^\circ \text{V}$$

$$\dot{U}_2 = 10\dot{U}_1 = 33.3\angle 0^\circ \text{V}$$

16

解法3: 断开50Ω电阻, 求其左端戴维南等效电路

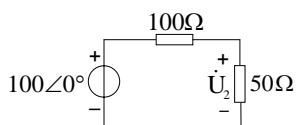
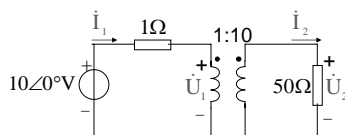
$$\therefore \dot{I}_2 = 0$$

$$\therefore \dot{I}_1 = 0$$

$$\dot{U}_1 = 10\angle 0^\circ \text{V}$$

$$\dot{U}_{oc} = 10\dot{U}_1 = 100\angle 0^\circ \text{V}$$

$$R_{eq} = 100 \times 1 = 100 \Omega$$



$$\dot{U}_2 = \frac{100\angle 0^\circ}{100+50} \times 50 = 33.3\angle 0^\circ \text{V}$$

17