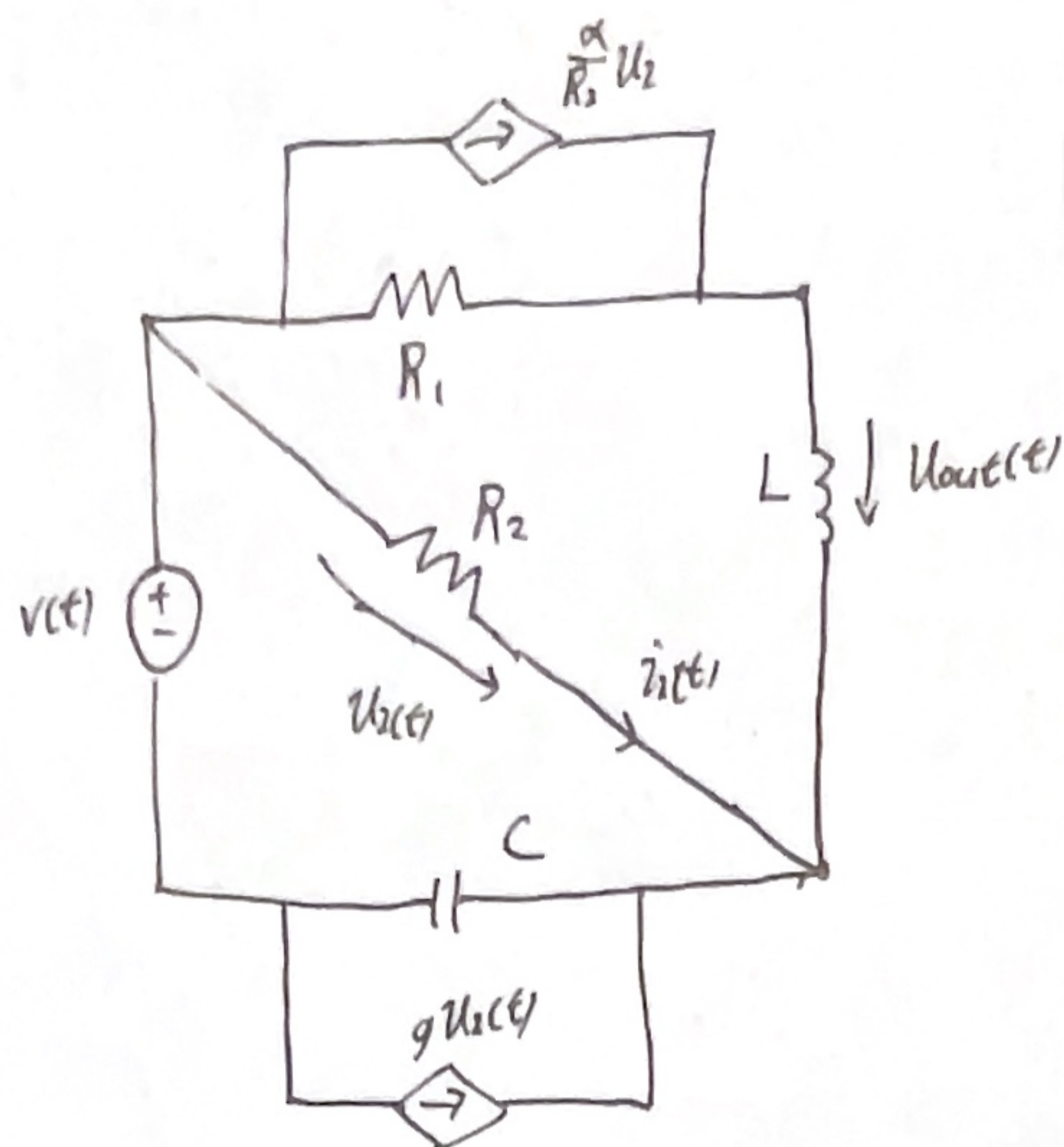
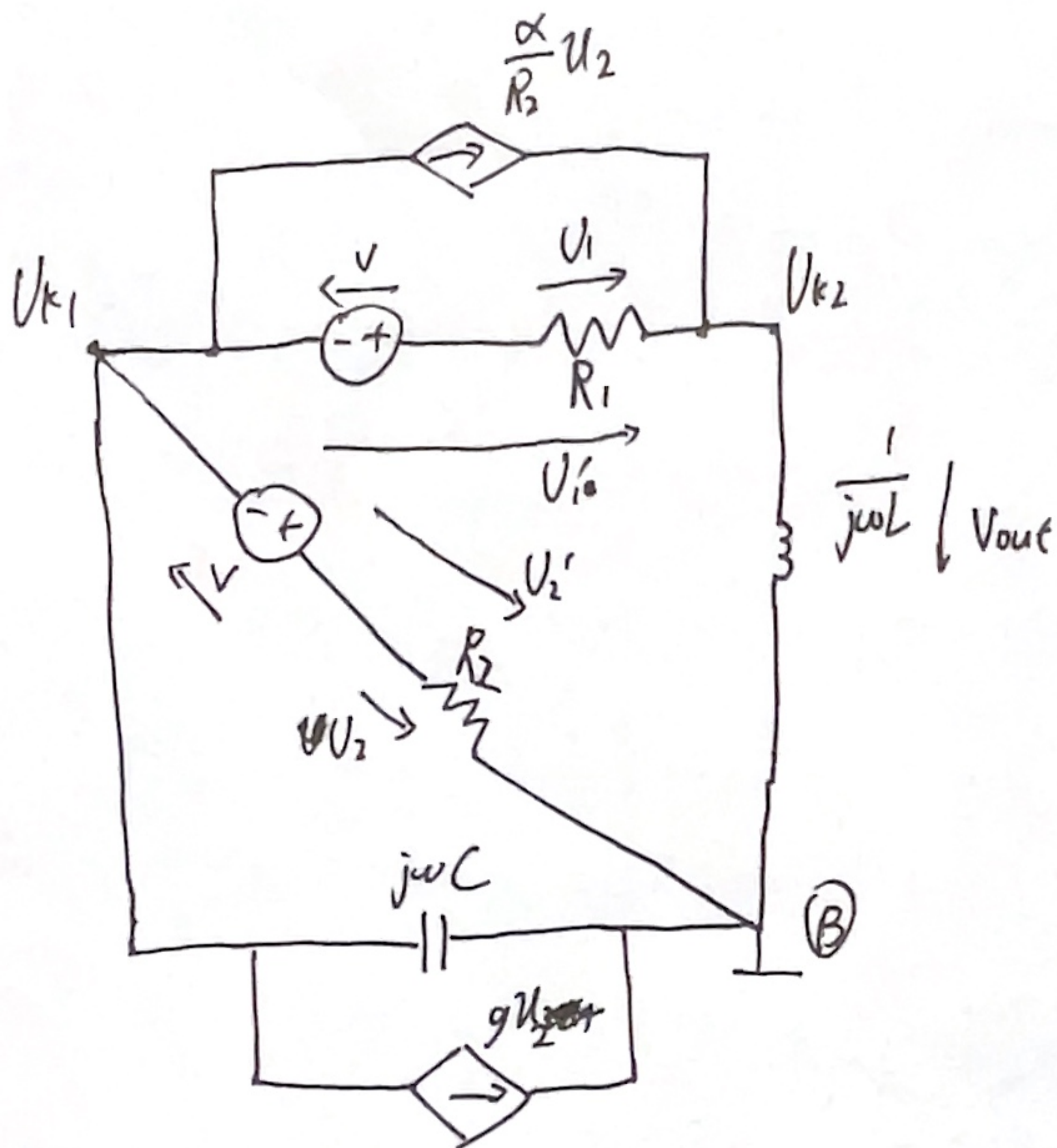


Knotenpotentialverfahren

$\underline{U} = \underline{I} \Rightarrow$ 要设电压 \rightarrow 不能含电压源



a. im Komplexbereich und Knotenpotentialverfahren



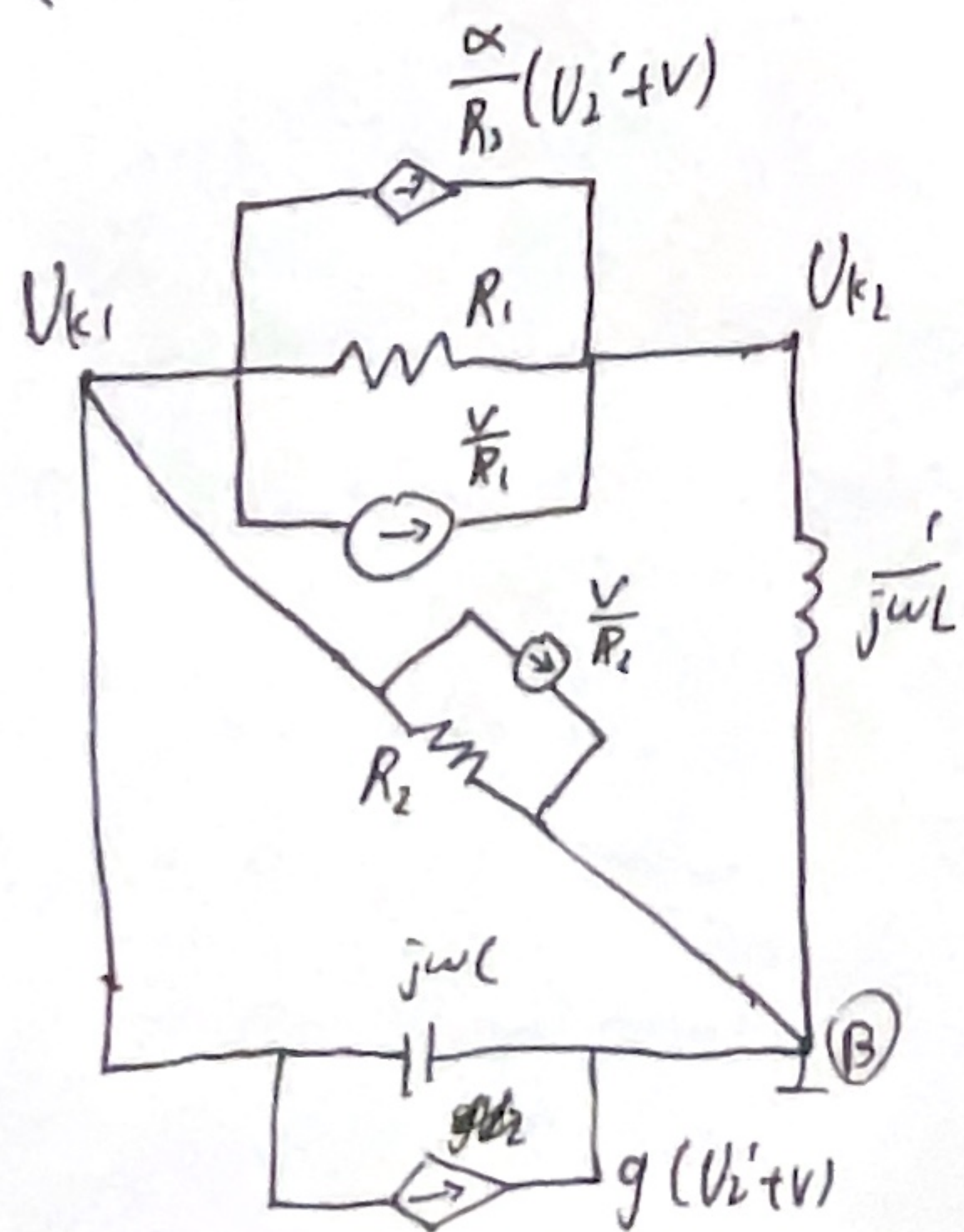
$$U_1' = U_1 - V \Leftrightarrow U_1 = U_1' + V$$

$$U_2' = U_2 - V \quad U_2 = U_2' + V$$

$$n = 3 - 1 = 2$$

b. 列写 节点导纳矩阵

$$\begin{pmatrix} \frac{1}{R_1} + \frac{1}{R_2} + j\omega C & -\frac{1}{R_1} \\ -\frac{1}{R_1} & \frac{1}{R_1} + \frac{1}{j\omega L} \end{pmatrix} \begin{pmatrix} U_{k1} \\ U_{k2} \end{pmatrix} = \begin{pmatrix} -\frac{V}{R_1} - \frac{V}{R_2} - \frac{\alpha}{R_2}(U_2' + V) - g(U_2' + V) \\ \frac{V}{R_1} + \frac{\alpha}{R_2}(U_2' + V) \end{pmatrix}$$



$$U_2' = U_{k1}$$

$$\Rightarrow \begin{pmatrix} \frac{1}{R_1} + \frac{1}{R_2} + j\omega C + \frac{\alpha}{R_2} + g & -\frac{1}{R_1} \\ -\frac{1}{R_1} - \frac{\alpha}{R_2} & \frac{1}{R_1} + \frac{1}{j\omega L} \end{pmatrix} \begin{pmatrix} U_{k1} \\ U_{k2} \end{pmatrix} = \begin{pmatrix} -\frac{V}{R_1} - \frac{V}{R_2} - \frac{\alpha}{R_2}V - gV \\ \frac{V}{R_1} + \frac{\alpha}{R_2}V \end{pmatrix}$$

d. $H(j\omega) = \frac{V_{out}}{V}$

$$V_{out} = V_{k2} = \frac{\begin{vmatrix} \frac{1}{R_1} + \frac{1}{R_2} + j\omega C + \frac{\alpha}{R_2} + g & -V(\frac{1}{R_1} + \frac{1}{R_2} + \frac{\alpha}{R_2} + g) \\ -\frac{1}{R_1} - \frac{\alpha}{R_2} & \frac{V}{R_1} + \frac{\alpha}{R_2} V \end{vmatrix}}{\det \underline{Y}}$$

$$H(j\omega) = \frac{\dots}{\dots}$$