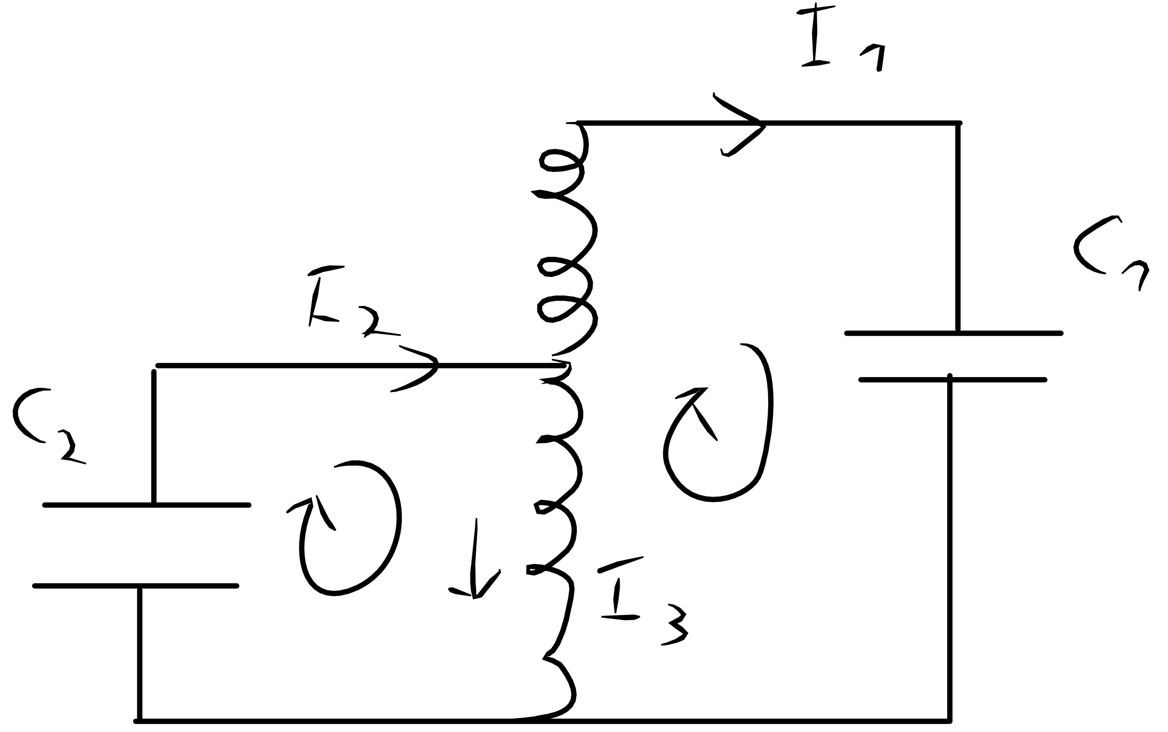

$$I_2 = I_1 + I_3$$

$$\frac{Q_2}{C_2} = -\dot{I}_3 L + M \dot{I}_1$$

$$\frac{Q_1}{C_1} = -\dot{I}_1 L + \dot{I}_3 L + M \dot{I}_3 - \dot{I}_1 M$$

$$Q_2 = -L C_2 \left(\ddot{Q}_2 - \ddot{Q}_1 \right) + L C_2 \ddot{Q}_1 \qquad M = L = L_1 = L_2$$

$$Q_1 = -2 L C_1 \ddot{Q}_1 + \left(\ddot{Q}_2 - \ddot{Q}_1 \right) 2 L C_1$$

$$\begin{bmatrix} Q_1 \\ Q_2 \end{bmatrix} = \begin{bmatrix} -4LC_1 & 2LC_1 \\ 2LC_2 & -LC_2 \end{bmatrix} \begin{bmatrix} \ddot{Q}_1 \\ \ddot{Q}_2 \end{bmatrix}$$

$$Q_1 = A e^{i\omega t}$$

$$Q_2 = B e^{i\omega t}$$

$$\begin{bmatrix} 1 - 4L\omega^2 C_1 & 2LC_1\omega^2 \\ 2LC_2\omega^2 & 1 - LC_2\omega^2 \end{bmatrix} \begin{bmatrix} A \\ B \end{bmatrix} = \bar{0}$$

$$\left(1 - 4L\omega^2 C_1\right)\left(1 - LC_2\omega^2\right) - 4L^2 C_1 C_2 \omega^4 = 0$$

$$1 - \omega^2 \left(4LC_1 + LC_2 \right) = 0$$

$$\omega = \sqrt{\frac{1}{L(4C_1 + C_2)}}$$