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Writing loop equation for loop 1 \Rightarrow

$$\frac{1}{C} (q_1^+ - q_1^-) - L (\dot{I}_1^+ + \dot{I}_2^-) + L (\dot{I}_1^- + \dot{I}_3^+) = 0$$

But, $I^+ = -\frac{dq^+}{dt}$ and $q^+ + q^- = 0$

(Since capacitor has no net charge) $\Rightarrow I^+ + I^- = 0$

$$\therefore -\frac{1}{C} I_1^+ - L [2\ddot{I}_1^+ - \ddot{I}_2^+ - \ddot{I}_3^+] = 0 \text{ and cyclically.}$$

In a normal mode $\ddot{I}_n = -\omega^2 I_n$. Put this fact into the equations to get the set