Dragt 95 cont

$$\omega^2 L [2I_1 - I_2 - I_3] - \frac{1}{C} I_1 = 0$$

$$\omega^2 L [2I_2 - I_3 - I_1] - \frac{1}{C} I_2 = 0 \qquad \text{or}$$

$$\omega^2 L [2I_3 - I_1 - I_2] - \frac{1}{C} I_3 = 0$$

$$\begin{pmatrix} 2-\frac{1}{\omega^2 LC} & -1 & -1 \\ -1 & 2-\frac{1}{\omega^2 LC} & -1 \\ -1 & -1 & 2-\frac{1}{\omega^2 LC} \end{pmatrix} \begin{pmatrix} I_1 \\ I_2 \\ I_3 \end{pmatrix} = 0 \qquad \text{Let } x = -\left(2 - \frac{1}{\omega^2 LC}\right)$$

$$\Rightarrow \begin{vmatrix} x & 1 & 1 \\ 1 & x & 1 \\ 1 & 1 & x \end{vmatrix} = 0 = \begin{vmatrix} x & 0 & 1 \\ 1 & x-1 & 1 \\ 1 & 1-x & x \end{vmatrix} = \begin{vmatrix} 0 & 0 & 1 \\ 1-x & x-1 & 1 \\ 1-x^2 & 1-x & x \end{vmatrix} = (1-x)^2 + (1-x)(1-x^2)$$

$$= (1-x)^2 + (1-x)^2(1+x) = (2+x)(1-x)^2 \qquad \therefore \; x = 1, 1, -2$$

$$\Rightarrow \frac{1}{\omega^2 LC} - 2 = 1, 1, -2 \Rightarrow \frac{1}{\omega^2 LC} = 3, 3, 0 \Rightarrow \boxed{\omega = \sqrt{\frac{1}{3LC}}, \sqrt{\frac{1}{3LC}}, \infty}$$