$$NI: \quad \frac{\hat{V}_1 - 60\angle 0}{2 + j4} + \frac{\hat{V}_1}{6} + \frac{\hat{V}_1 - \hat{V}_2}{-j2} = 0$$

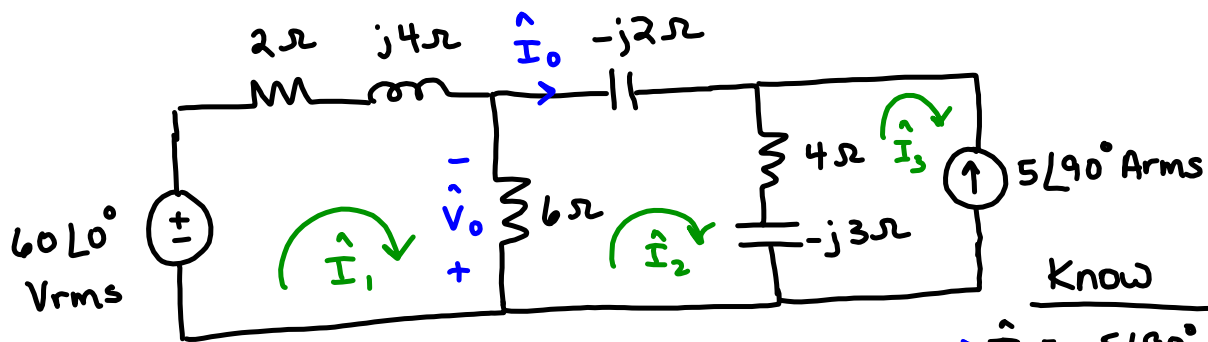$$N2: \quad \frac{\hat{V}_2 - \hat{V}_1}{-j2} + \frac{\hat{V}_2}{4 - j3} + (-5\angle 90°) = 0$$

(1) $\hat{V}_1 (0.40\angle 48.37°) + \hat{V}_2 (0.5\angle -90) = 13.42 \angle -63.43°$

(2) $\hat{V}_1 (0.5 \angle -90°) + \hat{V}_2 (0.64 \angle 75.53°) = 5\angle 90°$

$$\hat{V}_1 = 25.91 \angle -46.25° \; Vrms \qquad \hat{I}_0 = 6.07 \angle -34.42° \, Arms$$

$$\hat{V}_2 = 26.26 \angle -19.37° \; Vrms$$

2Ω $j4\Omega$ $\hat{I}_0$ $-j2\Omega$

$60\angle 0°$ Vrms

$\hat{I}_1$ $\hat{V}_0$ 6Ω $\hat{I}_2$ 4Ω $\hat{I}_3$ $-j3\Omega$ $5\angle 90°$ Arms

$\underline{\text{Know}}$

$\rightarrow \hat{I}_3 = -5\angle 90°$
$= 5\angle -90°$ Arms

$* \ \hat{I}_0 = \hat{I}_2$

$* \ \hat{V}_0 = 6(\hat{I}_2 - \hat{I}_1)$

m1: $60\angle 0° - (2+j4)\hat{I}_1 - 6(\hat{I}_1 - \hat{I}_2) = 0$

m2: $-6(\hat{I}_2 - \hat{I}_1) - (-j2)\hat{I}_2 - (4-j3)(\hat{I}_2 - \overset{5\angle -90°}{\hat{I}_3}) = 0$
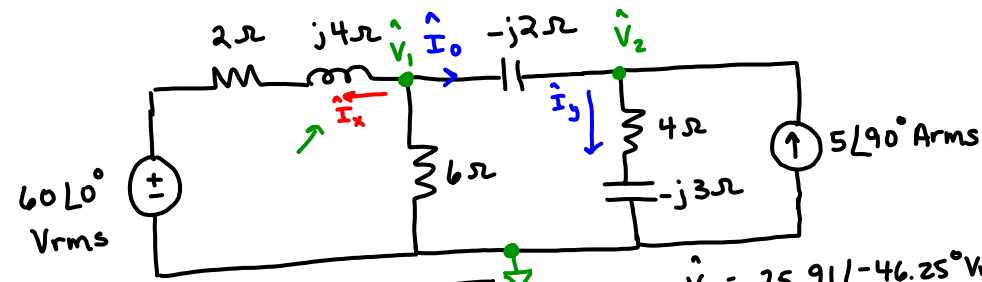
m1: $\hat{I}_1(-8-j4) + \hat{I}_2(6) = 60\angle 180°$

m2: $\hat{I}_1(6) + \hat{I}_2(-10+j5) = 25\angle 53.13°$

$\hat{I}_1 = 10.32\angle -39.47°$ Arms

$\hat{I}_2 = 6.07\angle -34.51°$ Arms

$\hat{V}_0 = 25.83\angle 133.53°$ Vrms

$\hat{I}_0 = 6.07\angle -34.51°$ Arms

The circuit diagram with components:
- 2Ω, $j4\Omega$, $-j2\Omega$ across the top
- $\hat{V}_1$, $\hat{I}_0$, $\hat{V}_2$ labels
- $\hat{I}_x$ (red), $\hat{I}_y$ (blue)
- $60\angle 0°$ Vrms source
- 6Ω, 4Ω, $-j3\Omega$
- $5\angle 90°$ Arms source

$$\hat{V}_1 = 25.91\angle -46.25° \text{ Vrms}$$
$$\hat{V}_2 = 26.26\angle -19.37° \text{ Vrms}$$
$$\hat{I}_0 = 6.07\angle -34.42° \text{ Arms}$$
$$\boxed{\hat{I}_x = 10.30\angle 140.54°}$$

2Ω: $P = (10.30)^2 \cdot 2 = 212.18 \text{ W, Abs}$

$\quad\quad Q = 0$

$\quad\quad \hat{S} = P + jQ = 212.18 + j0 \text{ VA}$

$\quad\quad\quad = 212.18 \angle 0° \text{ VA, Abs}$

ωL

$j4\Omega$: $\hat{S} = (I_{rms})^2 \cdot \omega L \angle 90°$

$\quad\quad = (10.3)^2 (4) \angle 90°$

$\quad\quad = 424.36 \angle 90° \text{ VA, Abs}$

$\quad P = 0 \quad Q = 424.36 \text{ VAR}$

6Ω: $\hat{S} = \dfrac{(V_{rms})^2}{6} \angle 0°$

$\quad\quad = \dfrac{(25.91)^2}{6} \angle 0°$

$\hat{S} = 111.89 \angle 0° \text{ VA, Abs}$

$P = 111.89 \text{ W, Abs}$

$Q = 0$

$-j2\Omega$: $P = 0$

$\dfrac{1}{\omega C}$

$\quad\quad Q = -\dfrac{(I_{rms})^2}{\omega C}$

$\quad\quad = -\dfrac{(6.07)^2}{1/2}$

$Q = -73.69 \text{ VAR, Abs}$

$\hat{S} = 73.69 \angle -90° \text{ VA, Abs}$

4Ω: $\hat{I}_y = \dfrac{\hat{V}_2}{4 - j3} = 5.25 \angle 17.50° \text{ Arms}$

$\quad\quad\quad\quad\quad 5.25$

$\quad\quad P = (I_{rms})^2 (4) = 110.33 \text{ W, Abs}$

$\quad\quad Q = 0$

$\quad\quad \hat{S} = 110.33 \angle 0° \text{ VA, Abs}$

$-j3\Omega$: $\hat{S} = \dfrac{(I_{rms})^2}{\omega C} \angle -90°$

$\dfrac{1}{\omega C}$

$\quad\quad = \dfrac{(5.25)^2}{1/3} \angle -90°$

$\quad\quad = 82.69 \angle -90° \text{ VA, Abs}$

Circuit diagram:

$2\,\Omega$ resistor, $j4\,\Omega$ inductor, $\hat{V_1}$, $\hat{I_0}$, $-j2\,\Omega$ capacitor, $\hat{V_2}$

$\hat{I_x}$ (red arrow)

$60\angle 0°$ Vrms source

$6\,\Omega$, $4\,\Omega$, $-j3\,\Omega$

$5\angle 90°$ Arms source

$\hat{V_1} = 25.91\angle -46.25°$ Vrms

$\hat{V_2} = 26.26\angle -19.37°$ Vrms
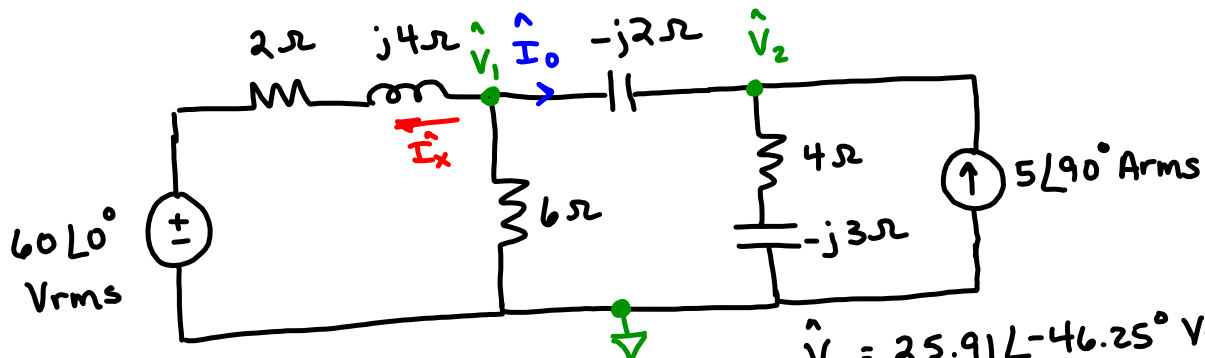
$\hat{I_x} = 10.30\angle 140.54°$

$\dfrac{60\angle 0°}{}$

$\hat{S} = \hat{V}\cdot\hat{I}^*$

$\quad = (60\angle 0)(10.30\angle -140.54°)$

$\quad = 617.92\angle -140.54°$ VA, Abs

or $\boxed{\hat{S} = 617.92\angle 39.46°\ \text{VA, Del}}$

$5\angle 90°$

$\hat{S} = \hat{V}\cdot\hat{I}^*$

$\quad = (26.26\angle -19.37)(5\angle -90°)$

$\boxed{\hat{S} = 131.30\angle -109.37°\ \text{VA, Del}}$

$Q = \text{Vrms Irms }\sin(\theta - \phi)$

$\quad = (26.26)(5)\sin(-19.37 - 90)$

$\quad = -123.87\ \text{VAR, Del}$

$P = \text{Vrms Irms }\cos(\theta - \phi)$

$\quad = (26.26)(5)\cos(-19.37 - 90)$

$\quad = -43.55\ \text{W, Del}$

$\hat{S} = -43.55 - j123.87\ \text{VA, Del}$