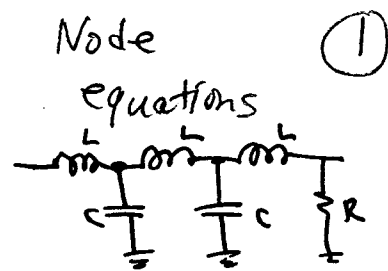


Qut 2 - test example - 5th order Low-pass

$$\textcircled{2} \quad \frac{1}{sL}(V_2 - V_1) + \frac{1}{sL}(V_2 - V_3) + sC(V_2) = 0$$

$$\textcircled{3} \quad \frac{1}{sL}(V_3 - V_2) + \frac{1}{sL}(V_3 - V_4) + sC(V_3) = 0$$

$$\textcircled{4} \quad \frac{1}{sL}(V_4 - V_3) + \frac{1}{R}(V_4) = 0$$



$$\textcircled{2} \quad V_1 \left(-\frac{1}{sL}\right) + V_2 \left(\frac{2}{sL} + sC\right) + V_3 \left(-\frac{1}{sL}\right) = 0$$

group by V

$$\textcircled{3} \quad V_2 \left(-\frac{1}{sL}\right) + V_3 \left(\frac{2}{sL} + sC\right) + V_4 \left(-\frac{1}{sL}\right) = 0$$

$$\textcircled{4} \quad V_3 \left(-\frac{1}{sL}\right) + V_4 \left(\frac{1}{sL} + \frac{1}{R}\right) = 0$$

$$\textcircled{2} \quad -V_1 + V_2(2 + s^2CL) - V_3 = 0$$

mult by SL

$$\textcircled{3} \quad -V_2 + V_3(2 + s^2CL) - V_4 = 0$$

$$\textcircled{4} \quad -V_3 + V_4 \left(1 + \frac{sL}{R}\right) = 0$$

$$\textcircled{3} \text{ for } V_2: \quad V_2 = V_3(2 + s^2CL) - V_4$$

$$\text{sub in } \textcircled{2}: \quad -V_1 + [V_3(2 + s^2CL) - V_4](2 + s^2CL) - V_3 = 0$$

$$-V_1 + V_3 \left[(2 + s^2CL)(2 + s^2CL) - 1 \right] - V_4(2 + s^2CL) = 0$$

$$-V_1 + V_3(3 + s^2(2CL) + s^4C^2L^2) - V_4(2 + s^2CL) = 0$$

$$\textcircled{4} \text{ for } V_3: \quad V_3 = V_4 \left(1 + \frac{sL}{R}\right)$$

$$\text{sub:} \quad -V_1 + V_4 \left[\left(1 + \frac{sL}{R}\right)(3 + s^2(2CL) + s^4C^2L^2) - (2 + s^2CL) \right] = 0$$

Simplify [---]

(2)

$$\left[3 + s^2(2CL) + s^4(C^2L^2) + s\left(\frac{3L}{R}\right) + s^3\left(\frac{2CL^2}{R}\right) + s^5\left(\frac{C^2L^3}{R}\right) - 2 - s^2(CL) \right]$$

$$\left[1 + s\left(\frac{3L}{R}\right) + s^2(CL) + s^3\left(\frac{2CL^2}{R}\right) + s^4(C^2L^2) + s^5\left(\frac{C^2L^3}{R}\right) \right]$$

$$V_4 [\dots] = V_1$$

$$\frac{V_4}{V_1} = \frac{1}{[\quad]}$$

$$\frac{V_4}{V_5} = \frac{1}{1 + s\left(\frac{3L}{R}\right) + s^2(CL) + s^3\left(\frac{2CL^2}{R}\right) + s^4(C^2L^2) + s^5\left(\frac{C^2L^3}{R}\right)}$$