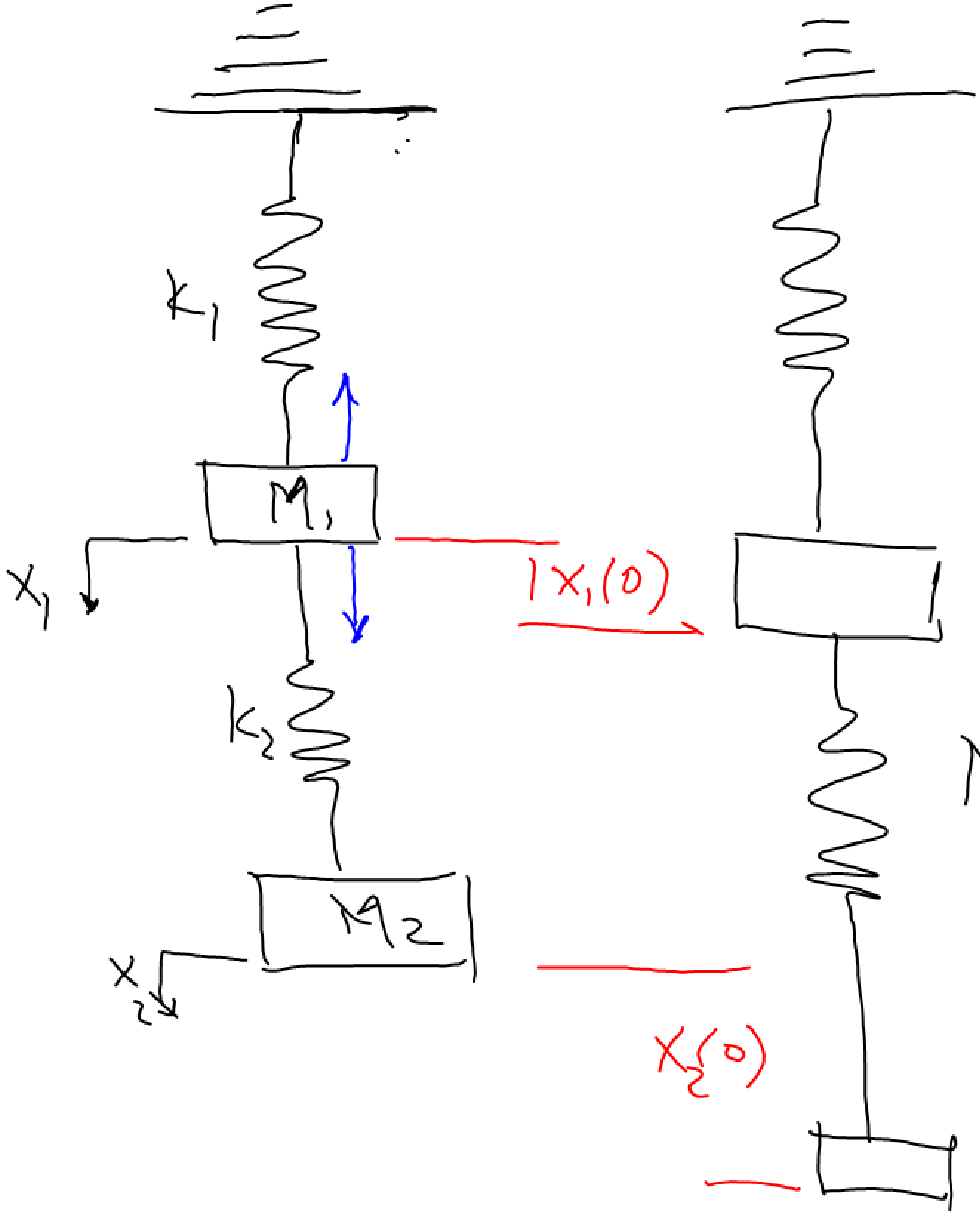


$$M_1 \frac{d^2x_1}{dt^2} = -k_1 x_1 + k_2(x_2 - x_1)$$

$$M_1 = 1$$

$$k_1 = 6$$

$$M_2 \frac{d^2x_2}{dt^2} = -k_2(x_2 - x_1)$$

$$M_2 = 1$$

$$K_2 = 4$$

$$x_2(0) = \frac{1}{10}$$

$$\frac{d^2x_1}{dt^2} = -6x_1 + 4(x_2 - x_1)$$

$$\frac{d^2x_2}{dt^2} = -4(x_2 - x_1)$$

$$x_2(0) = \frac{1}{10} \qquad x_1(0) = \frac{4}{6}\left(\frac{1}{10}\right)$$

$$x_3(0) = x_2'(0) = 0 \quad x_4(0) = x_1'(0) = 0$$

$$\frac{dx_1}{dt} = x_3 \qquad \frac{dx_2}{dt} = x_4$$

$$\frac{dx_1}{dt} = x_3 \qquad x_1(0) = \frac{4}{60}$$

$$\frac{dx_2}{dt} = x_4 \qquad x_2(0) = \frac{1}{10}$$

$$\frac{dx_3}{dt} = -10x_1 + 4x_2 \qquad x_3(0) = 0$$

$$\frac{dx_4}{dt} = 4x_1 - 4x_2 \qquad x_4(0) = 0$$

$$\frac{d}{dt}\underbrace{\begin{bmatrix} x_1 \\ x_2 \\ x_3 \\ x_4 \end{bmatrix}}_{\bar{x}} = \overbrace{\begin{bmatrix} 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \\ -10 & 4 & 0 & 0 \\ 4 & -4 & 0 & 0 \end{bmatrix}}^{A}\underbrace{\begin{bmatrix} x_1 \\ x_2 \\ x_3 \\ x_4 \end{bmatrix}}_{\bar{x}} \qquad \bar{x}(0) = \begin{bmatrix} \frac{4}{60} \\ \frac{1}{10} \\ 0 \\ 0 \end{bmatrix}$$

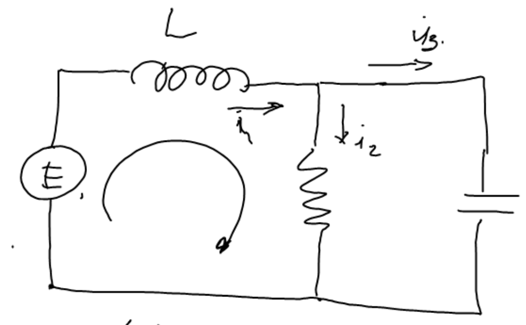
$$\frac{d}{dt}\bar{x} = A\bar{x}$$

$$\frac{dx_1}{dt} = x_3 \qquad x_1(0) = \frac{6}{4}\left(\frac{1}{10}\right)$$

$$\frac{dx_2}{dt} = x_4 \qquad x_2(0) = \frac{1}{10}$$

$$\frac{dx_3}{dt} = -10x_1 + 6x_2 \qquad x_3(0) = 0$$

$$\frac{dx_4}{dt} = 6x_1 - 6x_2 \qquad x_4(0) = 0$$



$$i_1 = i_2 + i_3$$

$$i_3 = i_1 - i_2$$

$E(t) = 60\cos(60t)$

$L = 1\ H.$

$R = 50\ \Omega$

$C = 10^{-4}\ F$

$$L\frac{di_1}{dt} + Ri_2 = E(t) \qquad i_1(0) = 0$$

$$RC\frac{di_2}{dt} + i_2 - i_1 = 0 \qquad i_2(0) = 0$$

$$\frac{di_1(t)}{dt} = -50i_2 + 60$$

50×10^{-4}

$\frac{50}{10{,}000}$

$\frac{5}{1000}$

$$\frac{di_2(t)}{dt} = 200i_1 - 200i_2$$

$$\frac{d}{dt}\begin{bmatrix} i_1(t) \\ i_2(t) \end{bmatrix} = \begin{bmatrix} 0 & -50 \\ 200 & -200 \end{bmatrix}\begin{bmatrix} i_1(t) \\ i_2(t) \end{bmatrix} + \begin{bmatrix} 60\cos(60t) \\ 0 \end{bmatrix}$$

$$\frac{d}{dt}\bar{i}(t) = AA\,\bar{i}(t) + \bar{b}(t) \qquad \bar{X}(0)$$

$$\bar{i}(t) = e^{AAt}\cdot\bar{X}(0) + \int_0^t e^{AA(t-\tau)}\,\bar{b}(\tau)\,d\tau.$$