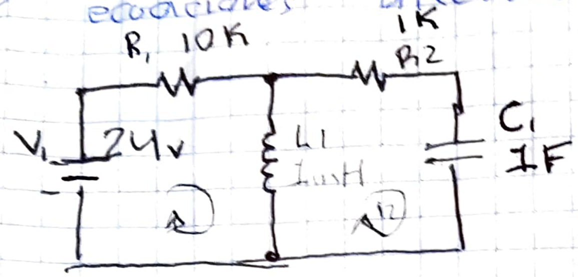
V

I R

TAREA VI

1. Modele y resuelva los siguientes sistemas de ecuaciones diferenciales:



Condiciones iniciales = 0

1) $V_{R_1} + V_L = 24v$

$I_{R_1} R_1 + L\frac{di}{dt} = 24v$

$I_1 R_1 + L\left(\frac{di_1}{dt} - \frac{di_2}{dt}\right) = 24v$

2) $V_{R_2} + V_C + V_L = 0$

$I_{R_2} R_2 + \frac{\int i\,dt}{C} + L\frac{di}{dt} = 0$

$I_2 R_2 + \frac{\int i\,dt}{C} + L\left(\frac{di_1}{dt} - \frac{di_2}{dt}\right) = 0$

Transformando.

1) $R_1 I(s) + L(sI_1(s) - I_1(0) - sI_2(s) + I_2(0)) = 24$

$10K\,I(s) + LsI_1(s) - LsI_2(s) = 24$

$I_1(s)(10K + Ls) + I_2(s)(-Ls) - 24 = 0$

2) $R_2 I_2(s) + \frac{I(s)}{Cs} + LsI_1(s) - LsI_2(s) = 0$

$1K\,I_2(s) + \frac{I_2(s)}{s} + LsI_1(s) - LsI_2(s) = 0$

$I_1(s)\,Ls + I_2(s)\left(1K + \frac{1}{s} - Ls\right) = 0$

1) $I_1(s) = \frac{24 + LsI_2(s)}{10K + Ls}$

1 en 2: $\left(\frac{24 + LsI_2(s)}{10K + Ls}\right)Ls + I_2(s)\left(1K + \frac{1}{s} - Ls\right) = 0$

$\frac{24Ls}{10K+Ls} + \frac{L^2s^2 I_2(s)}{10K+Ls} + I_2(s)\left(\frac{Ks + 1 - Ls^2}{s}\right) = 0$

$\frac{24Ls}{10K+Ls} + I_2(s)\left(\frac{L^2s^2}{10K+Ls} + \frac{Ks + 1 - Ls^2}{s}\right) = 0$

$I_2(s)\left(\frac{L^2s^3 + 10M + Ls^2K + 10K + Ls - 10Ls^2K - L^2s^3}{10sK + Ls^2}\right) = \frac{-24Ls}{10K + Ls}$

$I_2(s)\left(\frac{10010000 - 9Ls^2K + Ls}{10sK + Ls^2}\right) = \frac{-24Ls}{10K + Ls}$

$I_2(s) = \frac{-2520LsK - 24L^2s^3}{100100M + 10010LsK - 90Ls^2M - 9L^2s^2K + 10LsK + L^2s^2}$

Intento 2

1) $R_1 I(s) + L(sI(s) - I_1(0) - sI_2(s) + I_2(0)) = V$

2) $R_2 I_2(s) + \frac{I_2(s)}{CS} + LSI_1(s) - LSI_2(s) = 0$

$R_1 I_1(s) + L(sI_1(s) - sI_2(s)) = V$

$R_2 I_2(s) + \frac{I_2(s)}{CS} + LSI_1(s) - LSI_2(s) = 0$

$I_1(s)(R_1 + LS) + I_2(s)(-LS) = V$

$I_1(s)(LS) + I_2(s)(R_2 + \frac{1}{CS} - LS) = 0$

$$\left|\begin{array}{cc|c} R_1 + LS & -LS & V \\ LS & R_2 + \frac{1}{CS} - LS & 0 \end{array}\right.$$

$$W = (R_1 + LS)(R_2 + \frac{1}{CS} - LS) + L^2S^2 = R_1R_2 + \frac{R_1}{CS} - LSR_1 + LSR_2 + \frac{LS}{CS} - L^2S^2 + L^2S^2$$

$$I_1(s) = \frac{V(R_2 + \frac{1}{CS} - LS)}{R_1R_2 + \frac{R_1}{CS} - LSR_1 + LSR_2 + \frac{LS}{CS} - L^2S^2} = \frac{\frac{V(R_2CS + 1 - LCS^2)}{CS}}{\frac{R_1R_2CS + R_1 - LCS^2R_1 + LCS^2R_2 + LS}{CS}}$$

$$= \frac{24(1kS + 1 - 1mS^2)}{10MS + 10k - 9S^2 + 1mS} = \frac{24(1MS + 1k - 1S^2)}{10GS + 10M - 9kS^2 + S}$$

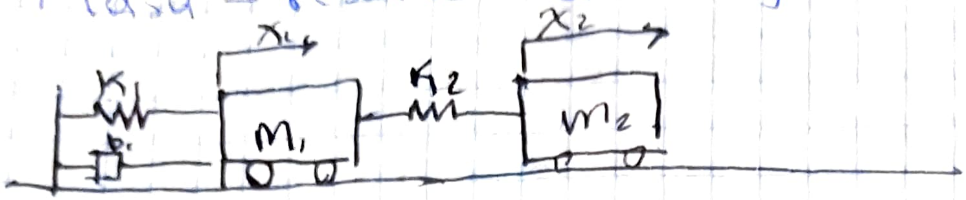
$$I_2(s) = \frac{-VLS}{W} = \frac{-VLS^2C}{CSW} = \frac{-24S^2}{10GS + 10M - 9kS^2 + S}$$

Antitransformando

$$I_1(s) = \frac{24(s^2 - 1000{,}000\,S - 1000)}{9000s^2 - 10000'000{,}001\,S - 10'000{,}000}$$

TAREA VIII

2. Masa - resorte amortiguador doble



$x_1(0) = 0.1$
$x_2(0) = 0.2$

$x_1'(0) = x_2'(0) = 0$

$K_1 = 5\,N/m, \quad K_2 = 3\,N/m.$

$b_1 = 10\,\frac{Ns}{m} \qquad m_1 = m_2 = 2\,kg$

1) $\Sigma F = 0 = -K_1(x_1) - b_1(x_1') + m_1(x_1'') - \dots$

2) $0 = -K_2(x_2 - x_1) + m_2(x_2'') = 0$

1) $2x_1'' - 10x_1' - 5x_1 = 0$

2) $2x_2'' \quad - 3x_2 = -3x_1$

Transformando

1) $2(s^2 X_1(s) - s\,x_1(0) -$