Circuitos Electricos II

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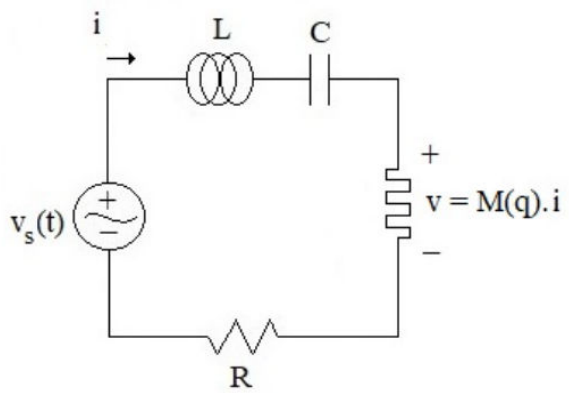
Soluciones propuestas para los ejercicios del taller 11

Problema 1

Problema

Considere el circuito RLCM,



Memristor y variables de estado,

$$M(q) = m_0 + m_1 q; \quad x_1 = q, \quad x_2 = i$$

1 Muestre que el circuito obedece las ecuaciones de estado,

$$\begin{aligned} \dot{x_1} &= x_2 \\ \dot{x_2} &= \frac{1}{L} v_s - \frac{1}{LC} x_1 - \frac{m_0 + R}{L} x_2 - \frac{m_1}{L} x_1 x_2 \\ y &= x_2. \end{aligned}$$

Parámetros,

$$(a) R = 2\Omega; \quad L = 0.5H; \quad C = 0.25; \quad m_0 = 0.5\Omega; \quad m_1 = 0.1\frac{\Omega}{C}$$

$$(b) R = 2\Omega; \quad L = 0.5H; \quad C = 0.25; \quad m_0 = 0.5\Omega; \quad m_1 = 1.0\frac{\Omega}{C}$$

Los valores de $\{m_0, m_1\}$ se proponen para la simulación y no corresponden a un dispositivo real.

2 Dibujar la salida y(t) para la entrada senoidal,

$$u(t) = 2.\sin\omega.t, \quad \omega = [0.1, 1.0, 5.0]r/s$$

Condiciones iniciales cero.

Ecuacion de malla

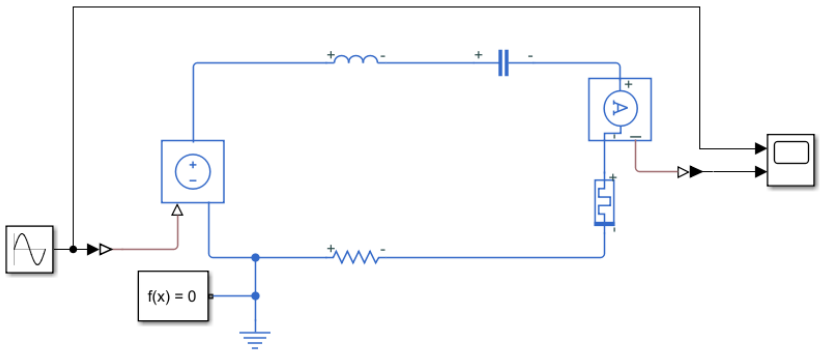
$$V_s = L\dot{x_2} + \frac{1}{C}x_1 + Rx_2 + (m_0 + m_1x_1)x_2$$

$$-L\dot{x_2} = -V_s + \frac{1}{C}x_1 + Rx_2 + (m_0 + m_1x_1)$$

$$-L\dot{x_2} = -V_s + \frac{1}{C}x_1 + Rx_2 + (m_0 + m_1x_1)$$

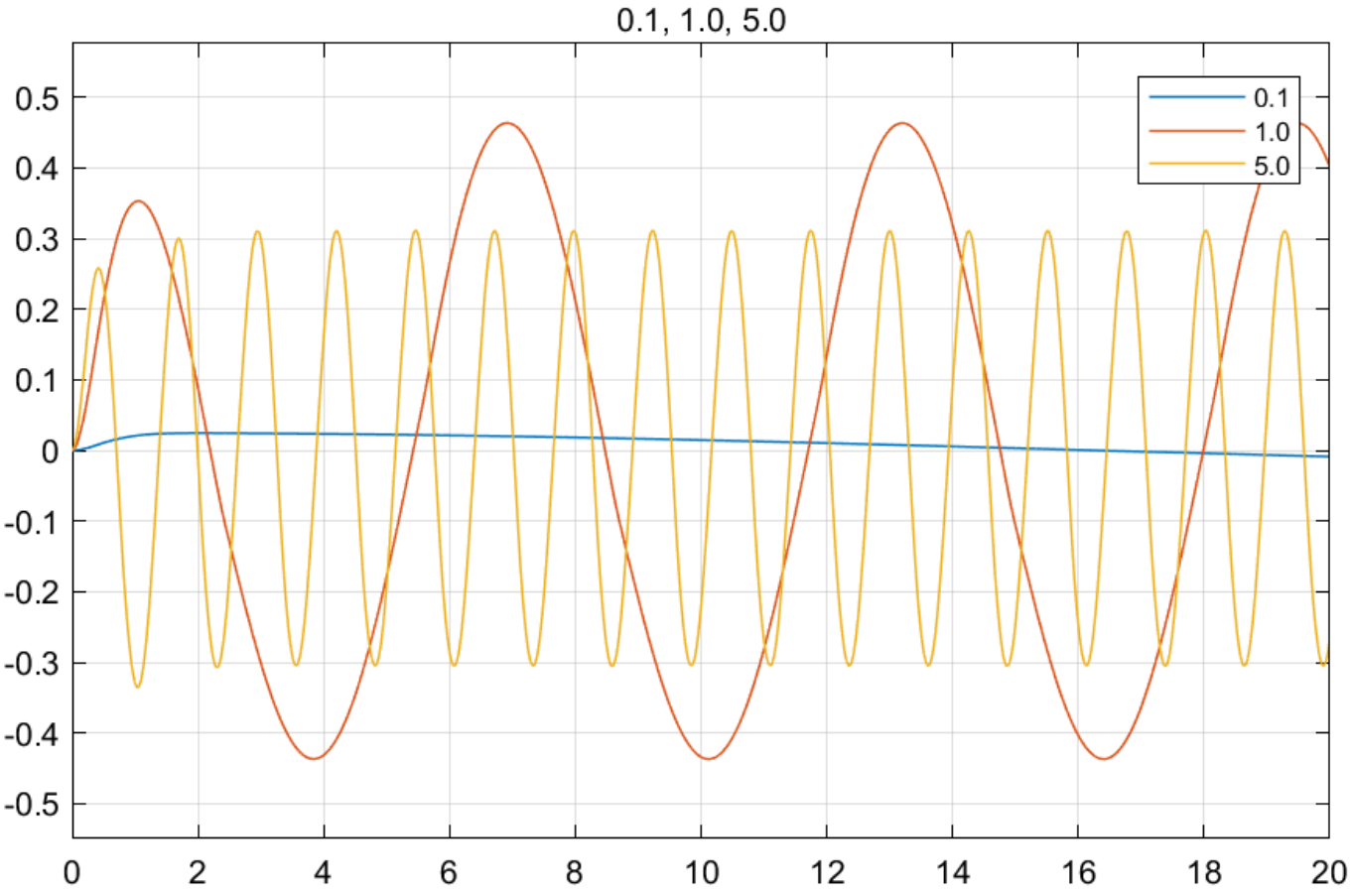
$$\dot{x_2} = \frac{V_s}{L} - \frac{1}{LC}x_1 - \frac{Rm_2}{L}x_2 - \frac{m_1}{L}x_1x_2$$

Simulacion



m_0 = 5

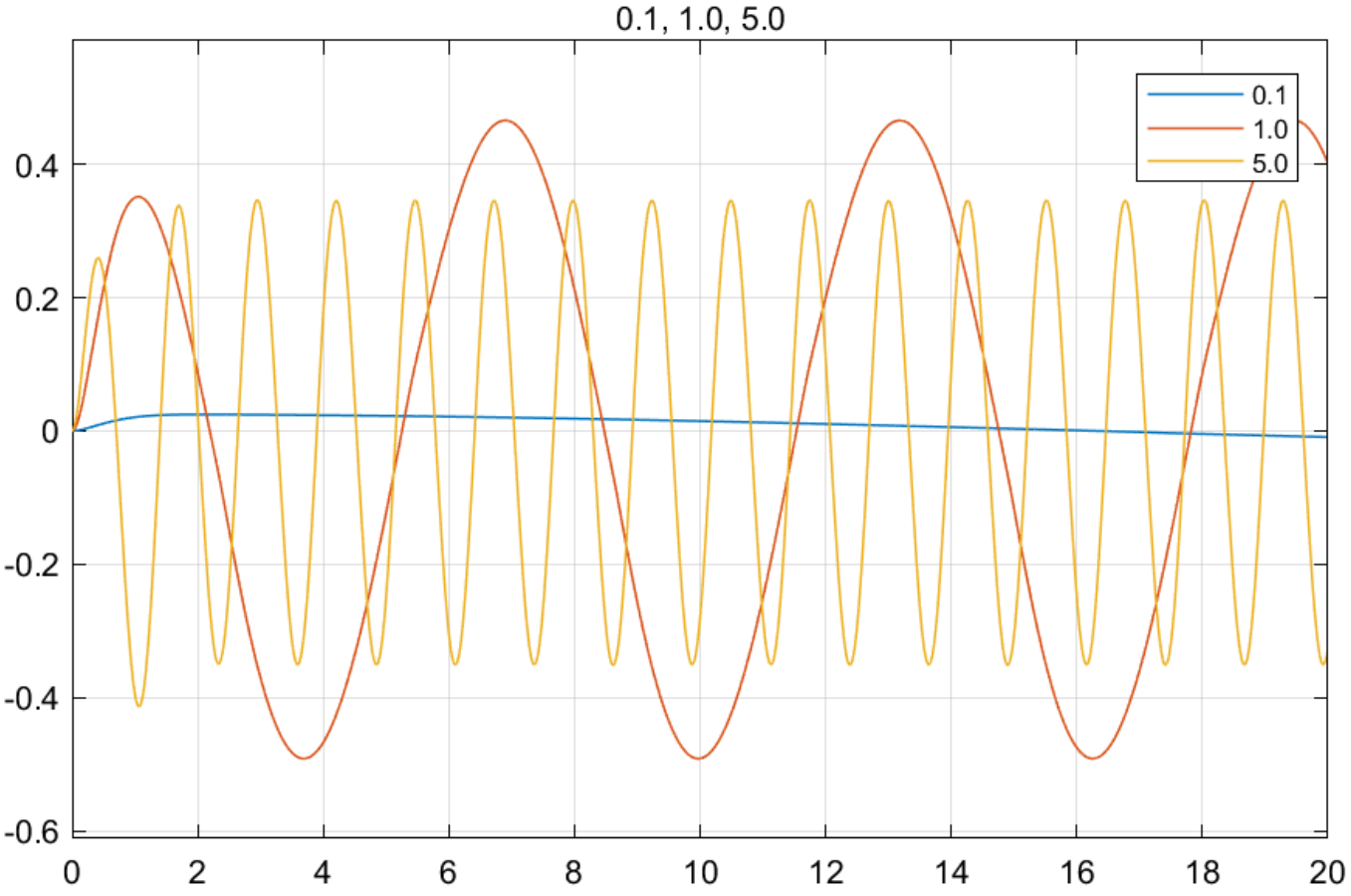
m_1 = 1



Offset=0

m_0 = 5

m_1 = 0.1



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