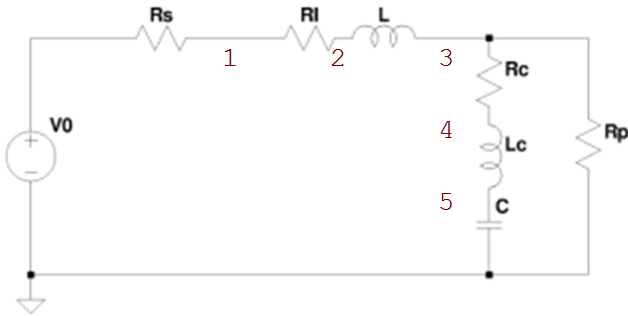


MNA Solver

- ☒ Numerical Inverse Laplace Transform
- ☒ MNA STAMPS
- ☒ Bode
- ☐ RLC



$$\chi := \begin{bmatrix} V_0 & [1 \ 0] & 350 \text{ V} \\ R_L & [1 \ 2] & 100 \text{ m}\Omega \\ R_C & [3 \ 4] & 300 \text{ m}\Omega \\ R_P & [3 \ 0] & 1 \text{ M}\Omega \\ L & [2 \ 3] & 100 \text{ }\mu\text{H} \\ L_C & [4 \ 5] & 0.1 \text{ }\mu\text{H} \\ C & [5 \ 0] & 440 \text{ }\mu\text{F} \end{bmatrix}$$

$$\begin{bmatrix} A & b & VI & V & I \end{bmatrix} := \text{MNA}(\chi, \text{MNA}_{AC})$$

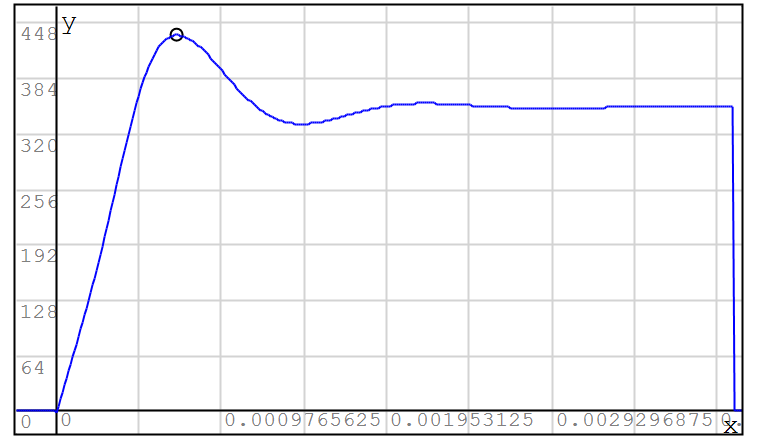
$$\begin{bmatrix} t_i & t_e \end{bmatrix} := [0 \text{ s} \ 4 \text{ ms}]$$

$$L := \chi_{5 \ 3}$$

Capacitor Voltage

$$\begin{cases} V_C(s) := \frac{V}{s} \\ v_C(t) := \text{ILap}(V_C(s), t, t_i, t_e, 16) \\ M := \text{Peak}(v_C(t), t_i, t_e) \end{cases}$$

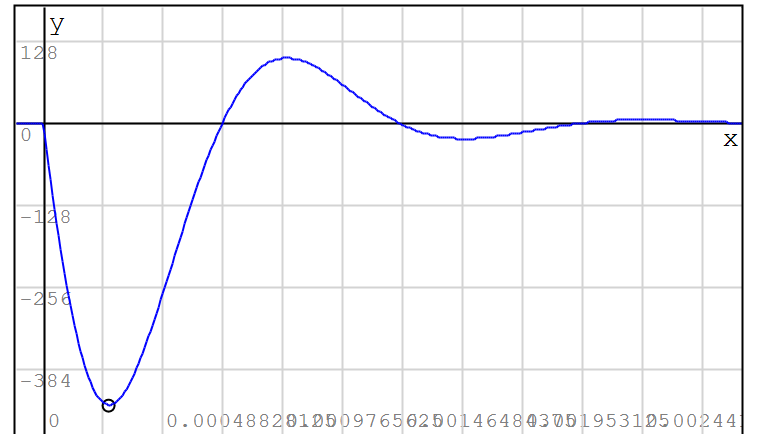
$$M_2 = 433.0934 \text{ V}$$



Source Current

$$\begin{cases} I_S(s) := \frac{I}{s} \\ i_S(t) := \text{ILap}(I_S(s), t, t_i, t_e, 20) \\ M := \text{Peak}(i_S(t), t_i, t_e) \end{cases}$$

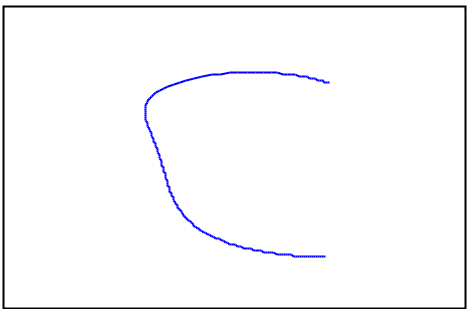
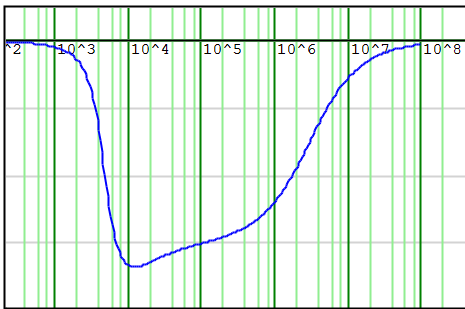
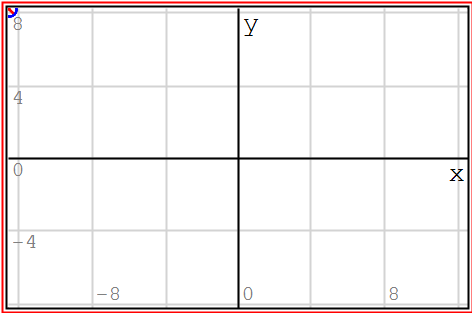
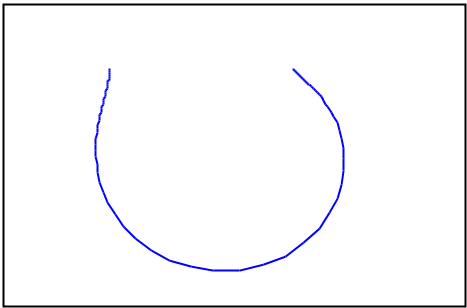
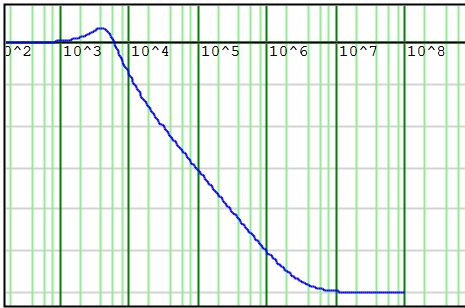
$$M_2 = -436.9802 \text{ A}$$



Freq domanain plots:

BodeMag Nyquist
ZP Plot Bode Phase Nichols

$$\left\{ \begin{array}{l} H(s) := \frac{V}{V} \frac{3}{1} \\ \text{Bode}_1 := \text{logspace}(2, 8) \text{ Hz} \\ \Pi := \text{Bode}(H(s)) \end{array} \right.$$



Symbolic solution

$\text{Clear}(L)=1$

$\chi_s := \chi_{[1..7][1..2]}$

$[A \ b \ VI \ V \ I] := \text{MNA}(\chi_s, \text{MNA}_{AC})$

$$A = \begin{bmatrix} \frac{1}{R_L} & -\frac{1}{R_L} & 0 & 0 & 0 & 1 \\ -\frac{1}{R_L} & \frac{s \cdot L + R_L}{s \cdot L \cdot R_L} & -\frac{1}{s \cdot L} & 0 & 0 & 0 \\ 0 & -\frac{1}{s \cdot L} & \frac{(R_C + R_P) \cdot s \cdot L + R_C \cdot R_P}{s \cdot L \cdot R_C \cdot R_P} & -\frac{1}{R_C} & 0 & 0 \\ 0 & 0 & -\frac{1}{R_C} & \frac{s \cdot L_C + R_C}{s \cdot L_C \cdot R_C} & -\frac{1}{s \cdot L_C} & 0 \\ 0 & 0 & 0 & -\frac{1}{s \cdot L_C} & \frac{s^2 \cdot C \cdot L_C + 1}{s \cdot L_C} & 0 \\ 1 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$$

$$b = \begin{bmatrix} 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ V_0 \end{bmatrix}$$

Alvaro