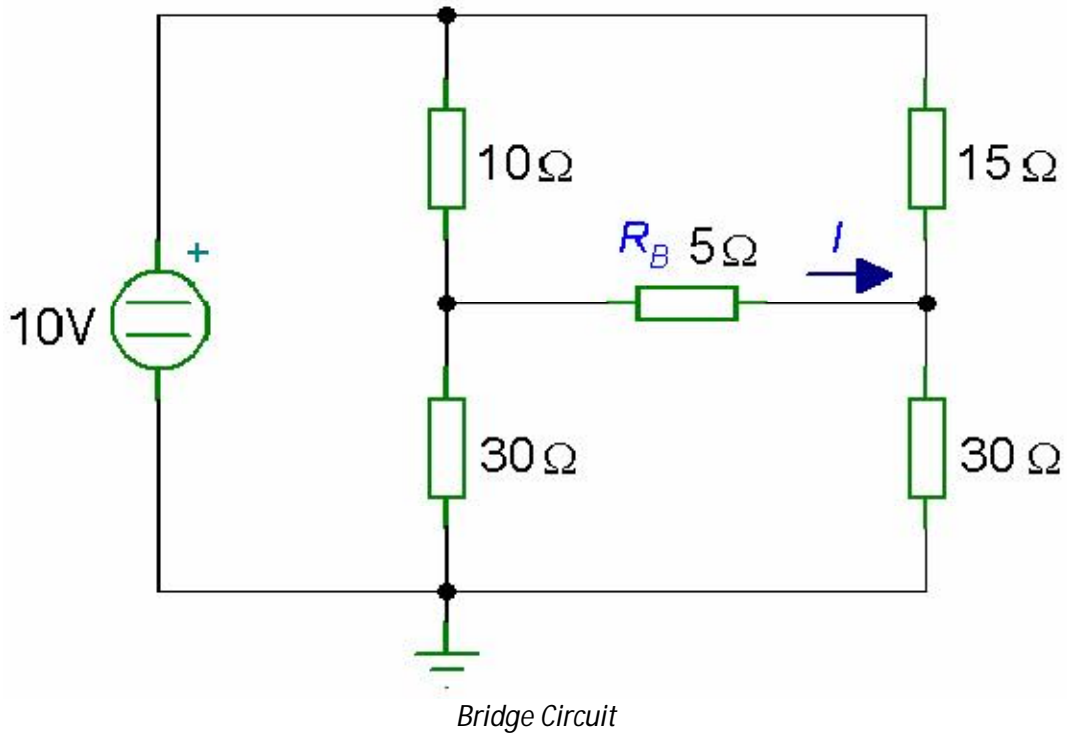


Loop Analysis

Example

For the circuit shown below find the current flowing through the resistor R_B . In addition find the power supplied by the voltage source.



Results from MATLAB

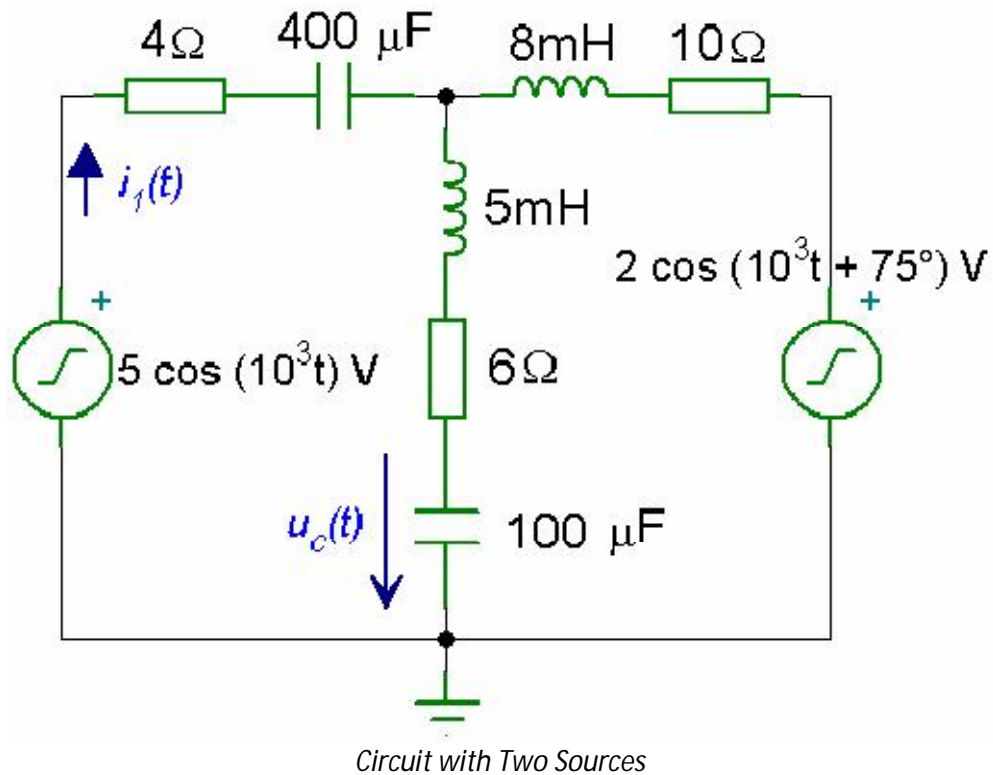
The current through the resistor R_B is 0.037037 A.
The power supplied by voltage source is 4.7531 W.

Solve the same example in SwitcherCAD.

Loop Analysis (AC Analysis)

Example

For the circuit shown below find the current $i_1(t)$ and the voltage $u_c(t)$.



Results from MATLAB

From the MATLAB results, the time domain current $i_1(t)$ is

$$i_1(t) = 0.388 \cos(10^3 t + 15.02^\circ) \text{ A}$$

and the time domain voltage $u_c(t)$ is

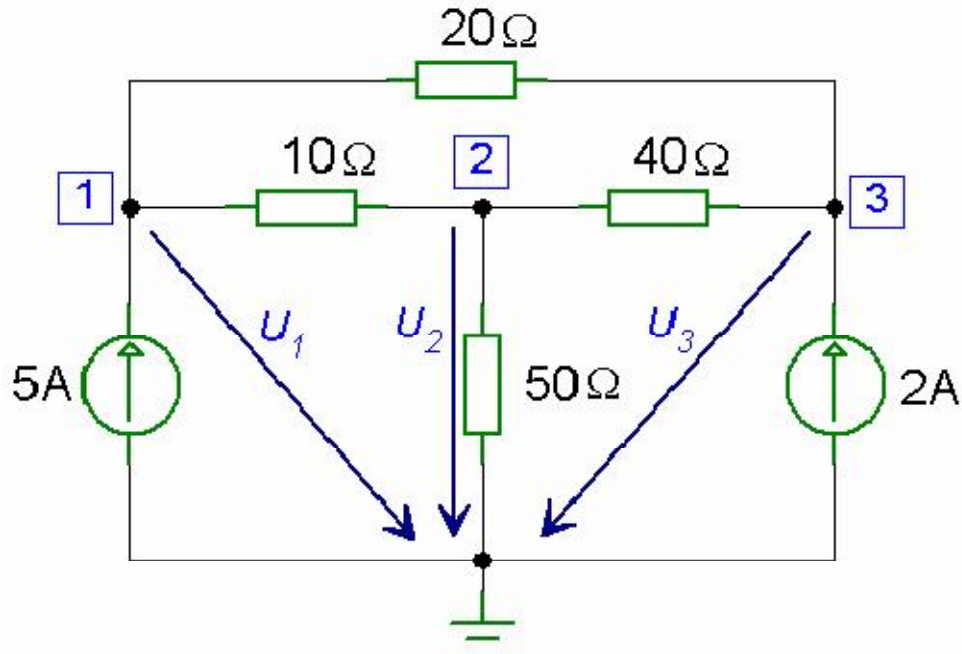
$$u_c(t) = 4.218 \cos(10^3 t - 40.86^\circ) \text{ V}$$

Solve the same example in SwitcherCAD.

Nodal Analysis

Example

For the circuit shown below find the nodal voltages U_1 , U_2 and U_3 .



Circuit with Nodal Voltages

Results from MATLAB

The nodal voltages U_1 , U_2 and U_3 are

$U =$

404.2857

350.0000

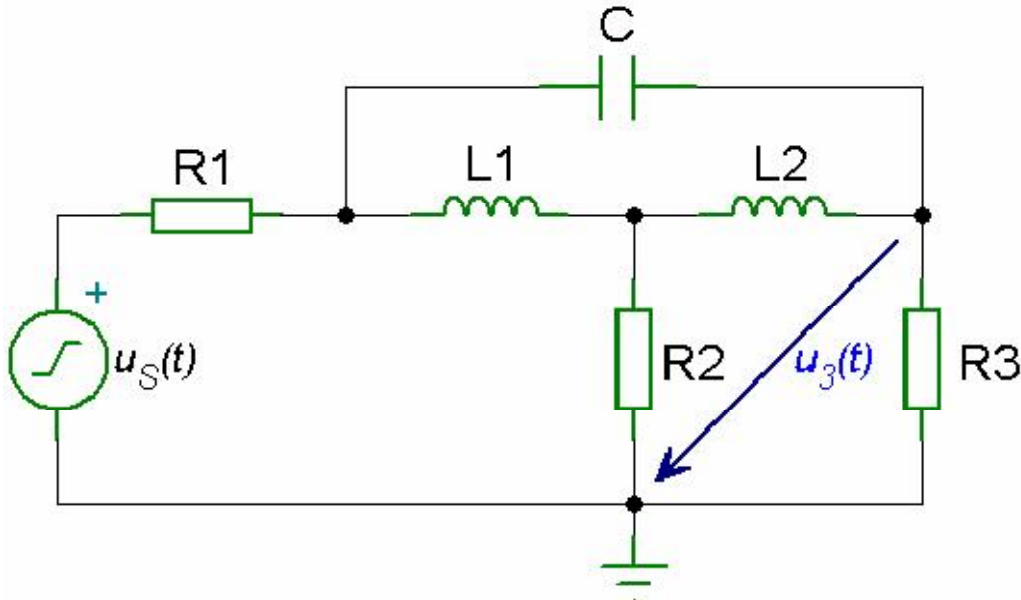
412.8571

Solve the same example in SwitcherCAD.

Nodal Analysis (AC Analysis)

Example

For the circuit shown below find the voltage $u_3(t)$ when $R_1 = 20 \Omega$, $R_2 = 100 \Omega$, $R_3 = 50 \Omega$, $L_1 = 4 \text{ H}$, $L_2 = 8 \text{ H}$, $C = 250 \mu\text{F}$, $u_S(t) = 8 \cos(\omega t + 15^\circ) \text{ V}$ and $\omega = 10 \text{ rad/s}$.



RLC Circuit with Sinusoidal Excitation

Results from MATLAB

voltage U_3 :

magnitude = 1.8504 V

angle = -72.4533°

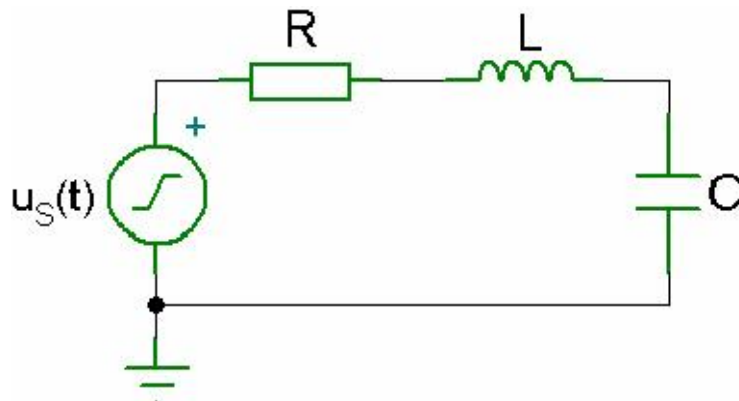
From the MATLAB results, the time domain voltage $u_3(t)$ is $u_3(t) = 1.85 \cos(\omega t - 72.45^\circ) \text{ V}$

Solve the same example in SwitcherCAD.

Resonance

Example

For the circuit shown below with using MATLAB plot the frequency dependency of the current magnitude and find the resonance frequency ω_r when $R = 5 \Omega$, $L = 20 \text{ mH}$, $C = 400 \mu\text{F}$ and $u_S(t) = 100 \sin(\omega t) \text{ V}$.



RLC Circuit

Results from MATLAB

The resonance frequency is

$\omega_r =$

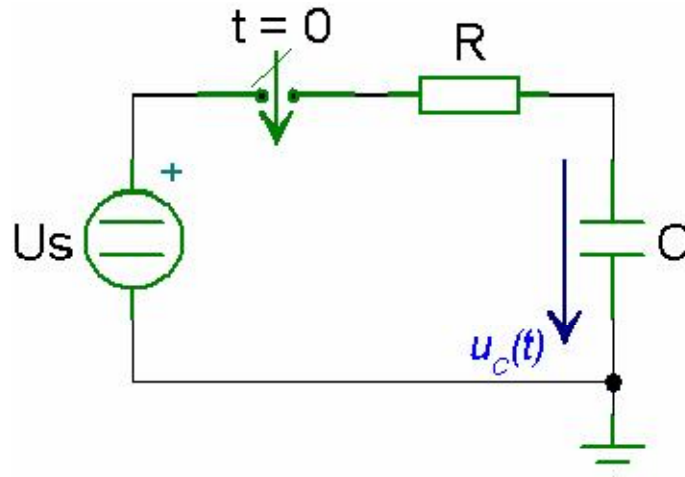
353.5534

Solve the same example in SwitcherCAD.

Transient Analysis

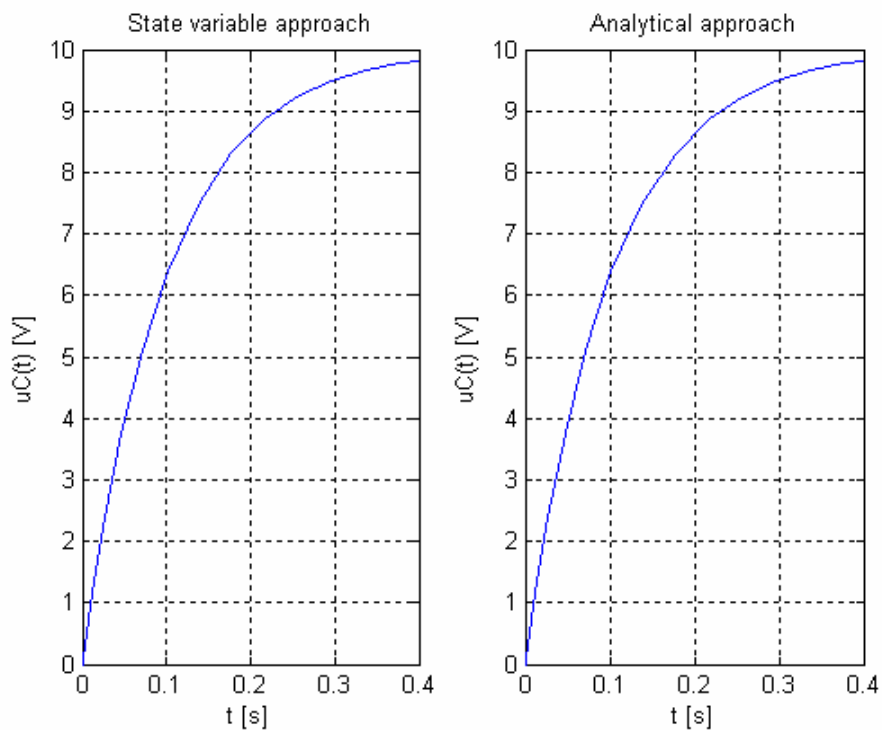
Example

For the circuit shown below find the voltage $u_C(t)$ between the interval 0 to 0.4 s, assuming that $u_C(0) = 0$ V. Use a numerical solution to the differential equations and analytical solution, when $R = 10$ k Ω , $C = 10$ μ F and $U_S = 10$ V.



Circuit

Results from MATLAB

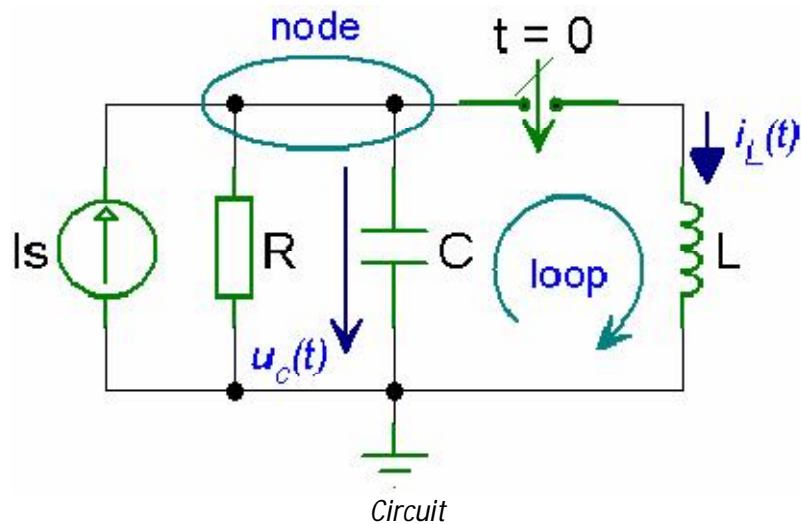


Solve the same example in SwitcherCAD.

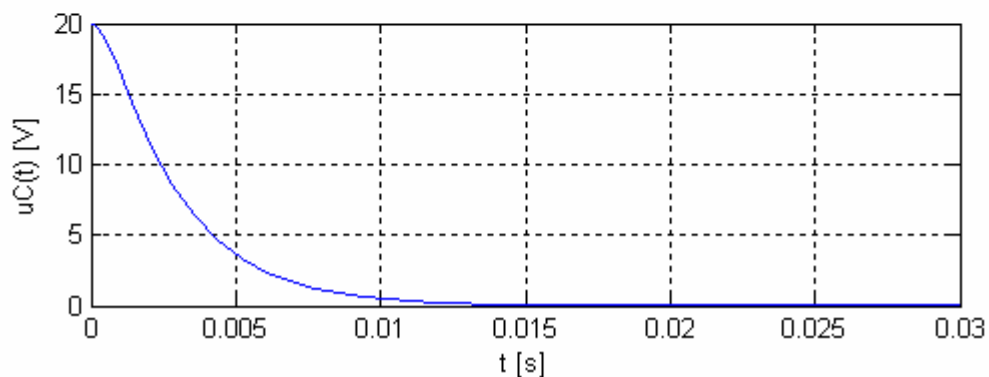
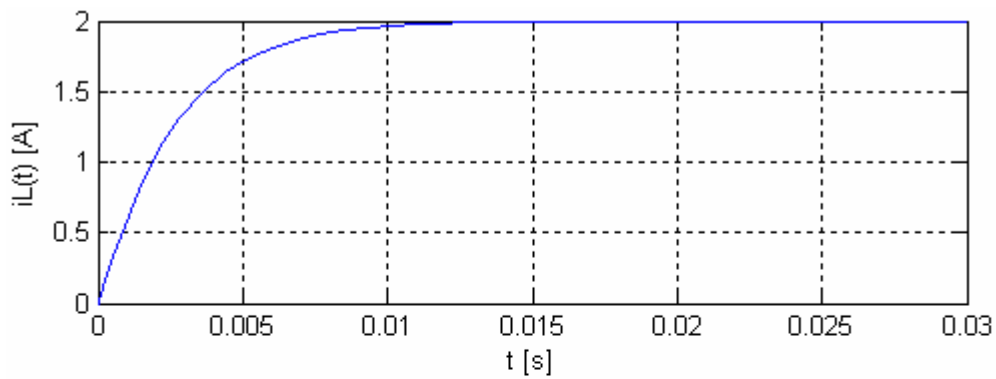
Transient Analysis

Example

For the circuit shown below find the current $i_L(t)$ and the voltage $u_C(t)$. Use a numerical solution to the differential equations, when $R = 10 \Omega$, $L = 31.25 \text{ mH}$, $C = 50 \mu\text{F}$ and $I_S = 2 \text{ A}$. The switch has been opened for a long time.



Results from MATLAB

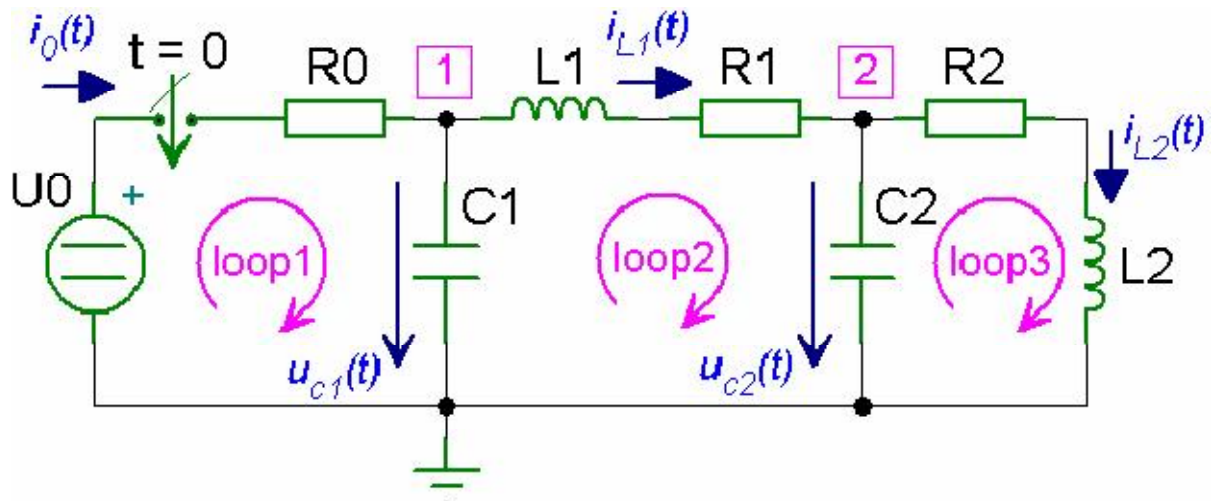


Solve the same example in SwitcherCAD.

Transient Analysis

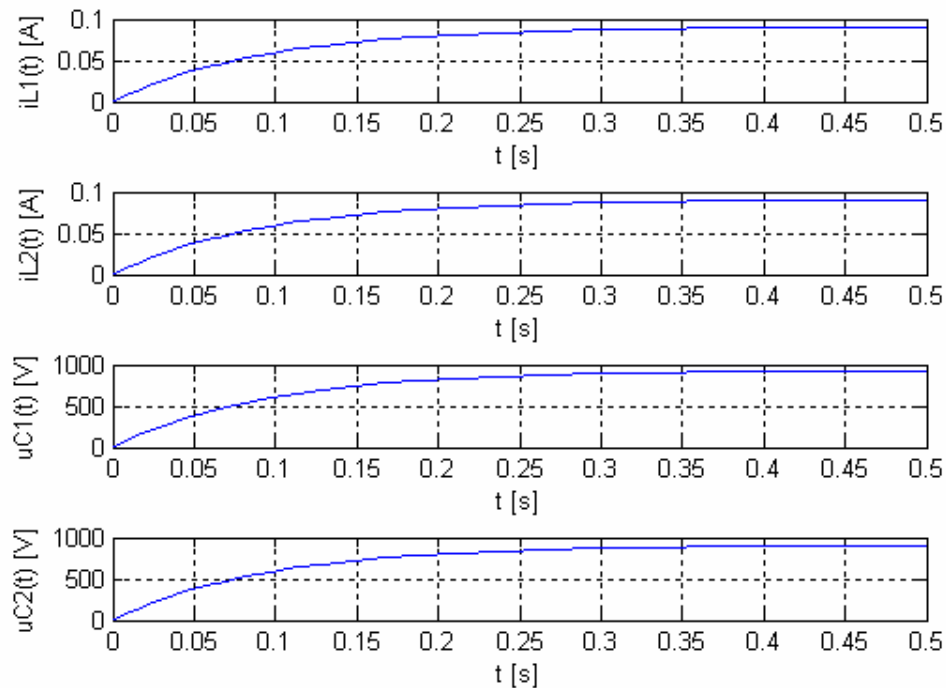
Example

For the circuit shown below find the currents $i_{L1}(t)$, $i_{L2}(t)$ and the voltages $u_{C1}(t)$, $u_{C2}(t)$. Use a numerical solution to the differential equations, when $R_0 = 100 \text{ k}\Omega$, $R_1 = 300 \text{ }\Omega$, $R_2 = 10 \text{ k}\Omega$, $L_1 = 0.01 \text{ mH}$, $L_2 = 10 \text{ mH}$, $C_1 = 10 \text{ }\mu\text{F}$, $C_2 = 10 \text{ nF}$, and $U_0 = 10 \text{ kV}$. The switch has been opened for a long time.



Circuit

Results from MATLAB



Solve the same example in SwitcherCAD.

Fourier Analysis

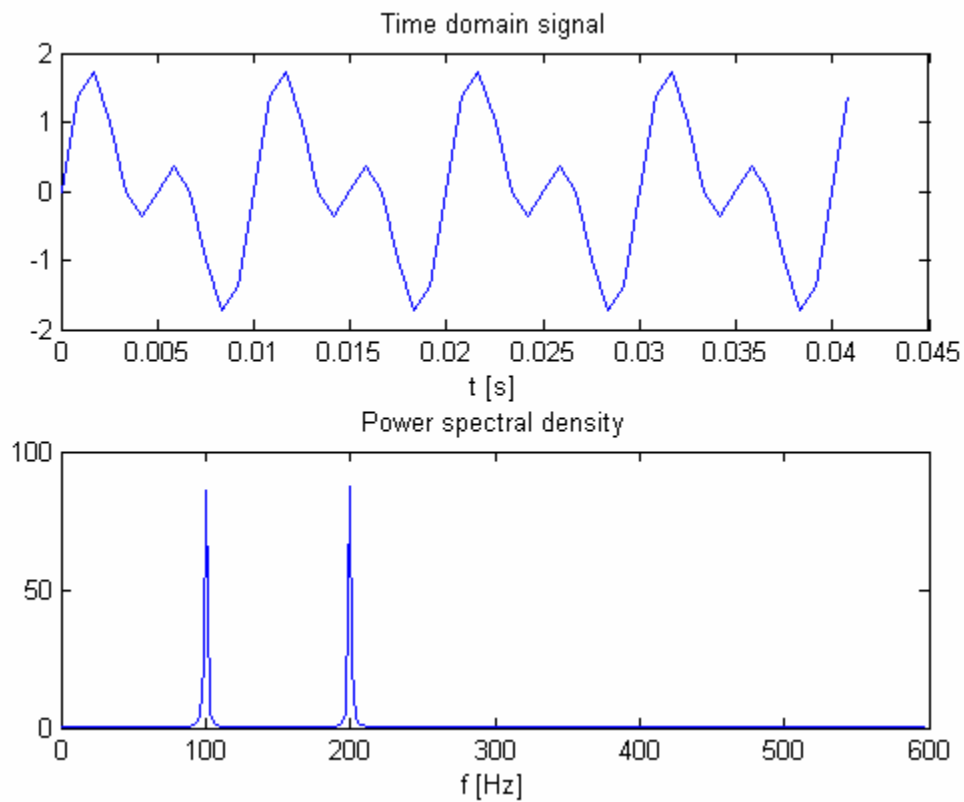
Example

Given a signal

$$g(t) = \sin(200\pi t) + \sin(400\pi t)$$

Generate and plot 512 points of $g(t)$. Assume a sampling rate of 1200 Hz. Find the power spectrum of $g(t)$.

Results from MATLAB



Solve the same example in SwitcherCAD.