Lab 2 work book

Thomas Wilson

B00836766

vin = 1;

R = 47;

L= 47e-6;

tfRL = tf([R], [L R]);

t = linspace (0, 10e-6, 1000);

Vin = ones(size(t));

Vout = step(tfRL, t);

plot(t, Vout);

title('Step response of R-L circuit');

xlabel ('Time(s)');

ylabel('Voltage(V)');

% The stability of this program allows a steady state value of 1

% Since R and L are both positive values, the pole has a negative real part.

%%

figure;

f = 50000;

t = 5\* (linspace(0, 1/f, 1000));

Vin = 5\*(square (2\*pi\*f\*t) >= 0);

lsim(tfRL, Vin, t);

title('Response of R-L circuit to 50 kHz square wave');

xlabel ('Time (s)');

ylabel('Voltage(V)');

% the response of the R-L circuit reaches a steady-state value after some time

%%Therefore, the R-L circuit remains stable in response to a square wave input

%%The code includes two different input signals,

% a step function and a square wave. The step function is a constant input,

% while the square wave is a periodic signal that alternates between two values.

% The code compares the response of the R-L circuit to both input signals,

% which allows you to see how the circuit behaves under different conditions.

%%Settling time:

%%The settling time is the time it takes for the output signal to reach and stay within a certain range of the steady-state value after a step input.

% In the first part of the code, a step input is used to obtain the step response of the R-L circuit.

% From the plot, you can observe that the output signal reaches a steady state value of 1 and settles to within 5% of this value in approximately 5 microseconds.

%%Time period of input signal:

%%The time period of the input signal is the time it takes for the signal to complete one cycle. In the second part of the code,

% a 50 kHz square wave input signal is used. The time period of this signal is 1/50 kHz,

% or 20 microseconds. In the third part of the code, a 500 kHz square wave input signal is used. The time period of this signal is 1/500 kHz, or 2 microseconds.

% By changing the frequency of the square wave input signal, you can observe how the circuit responds to signals with different time periods.

figure;

fHZ = 500000;

t = 5\* (linspace(0, 1/fHZ, 1000));

Vin = 5\* (square (2\*pi\*fHZ\*t) >= 0);

lsim(tfRL, Vin, t);

title('Response of R- circuit to 500 kHz square wave');

xlabel('Time (s)');

ylabel('Voltage (V)');

Figure 1

Chart

Description automatically generated

Figure 2

Chart

Description automatically generated

Figure 3

Chart, line chart, histogram

Description automatically generated