RC Circuit Lab Report

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Part I **Breadboard connections**

A picture containing text, electronics

Description automatically generated

W1

1+

100 Ohm Resistor

0.1 µF capacitor

ground

1-

2-

2+

Part II **Waveform Screenshots**

1. Y-axis shows input voltage amplitude

Chart, histogram

Description automatically generated

1. Y-axis shows output voltage amplitude

Histogram

Description automatically generated

Part III **Experiment Measurements**

Input Voltage Amplitude: 2 V

Output Voltage Amplitude: 1.24 V

Output Voltage Time Shift (7.03 µs

Output Voltage Phase Angle: -0.8834 rad

Part IV **MATLAB Results**

Capacitor Voltage Amplitude: 1.2454 V

Capacitor Phase: -0.8986 µs

Part V **Conclusion**

The MATLAB results and experimental results very similar so it is safe to assume that our procedure was done correctly. We were able to see that techniques such as nodal analysis do work on real world circuits and not just theoretical circuits.

Part VI **MATLAB Code**

clc

clear all

format compact

Vs=2;

R=100;

C=0.1e-6;

f=20e3;

om=2\*pi\*f;

ZC=-j/(om\*C);

%Matrices

Y=[1/R+1/ZC];

Is=[Vs/R];

V=Y\Is;

%V amplitude & phase angle

Vm=abs(V); %output voltage

Vph=angle(V);

%Current through circuit

I=Vs/(R+ZC);

Im=abs(I);

%Voltage through R

Vr=I\*R;

Vrm=abs(Vr);

%Voltage through C

Vc=Vs-Vr;

disp("Theoretical results:")

Vcm\_theoretical=abs(Vc)

Vcph\_theoretical=angle(Vc)

disp("----------------------------------")

%----------Comparing to experimental values--------------------------

disp("Experimental Results")

%Experimental voltage amplitude

Vcm\_experimental=1.24

%calculate experimental phase shift in radians

deltaT=7.03e-6 %time delay between waves

Vcph\_experimental=(-1\*360\*f\*deltaT\*pi)/(180) %times negative 1 since the output voltage is leading