INTRODUCTION TO ELECTRONICS LABORATORY

EXPERIMENT REPORT

Deney Adı	Linear Applications of Operational Amplifiers
Deneyi Yaptıran Ar. Gör.	Ensar VAHAPOĞLU
Raporu Hazırlayan (İsim / Numara / Bölüm)	Uğur Uysal– 150140012 – Bilgisayar Mühendisliği
Grup Numarası ve Deney Tarihi	B-10 – 11.10.2018

Rapor Notu	Teslim Edildiği Tarih	Teslim Alındığı Tarih
	18.10.2018	

1. Introduction

In this experiment, we worked on linear applications of operational amplifiers. We built inverting op-amp, non-inverting op-amp, summing and differential op-amp and differentiator and integrator op-amps circuits. We implemented circuits on CADET and measured the output voltage with oscilloscope and compared empirical results with theoric results.

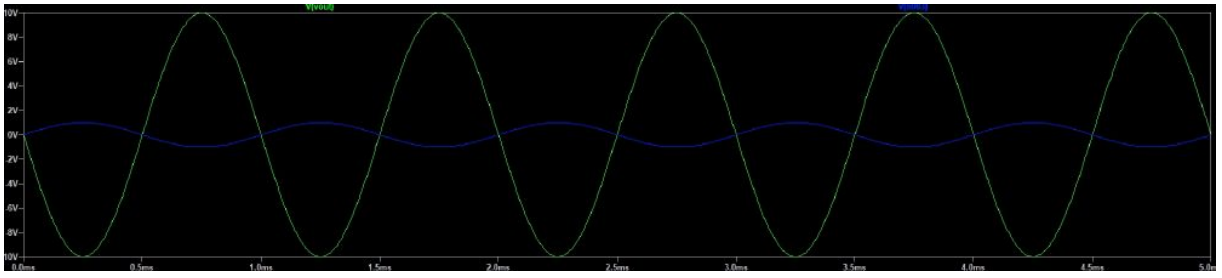
2. Experiment

2.1. Experiment-2.1

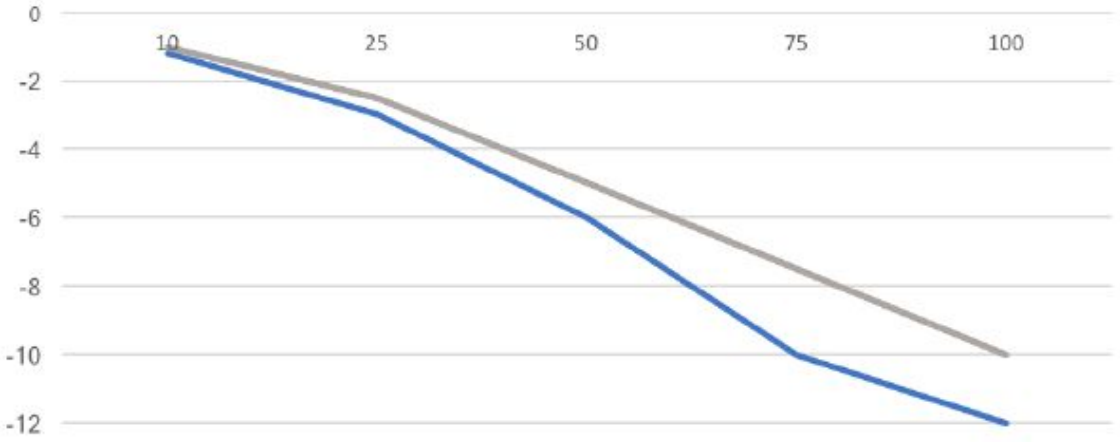
In this experiment, we built the given circuit then changed the R2 and measured the output voltage. In the table below you can see out measurements where input voltage is 350mV.

R2	Output Amplitude
100K	3.5V
75K	2.5V
50K	1.85V
25K	860mV
10K	350mV

Here the LTspice graph of Vin and Vout.



Here is the experimental and simulated graph. Blue line is experimental and gray one is LTspice simulation.

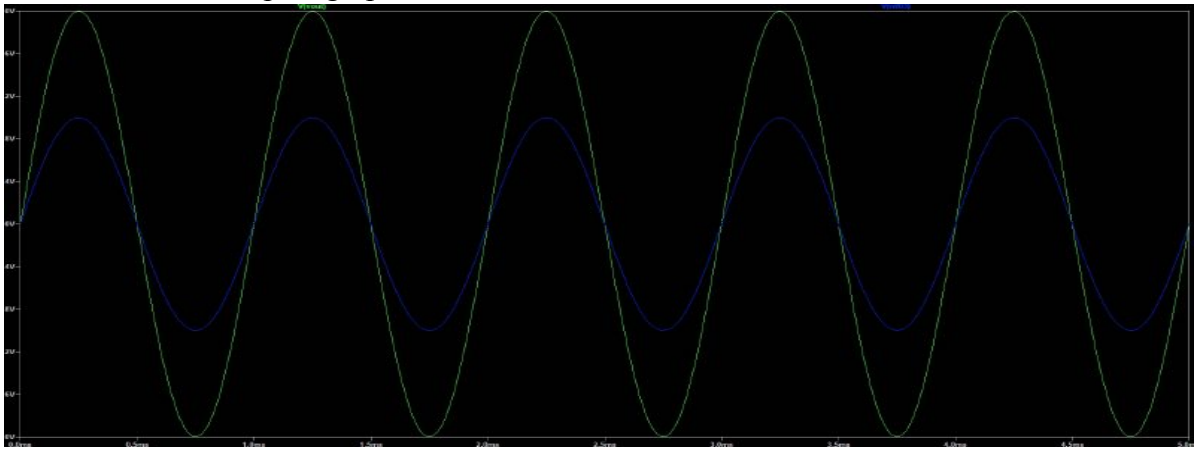


2.2. Experiment-2.2

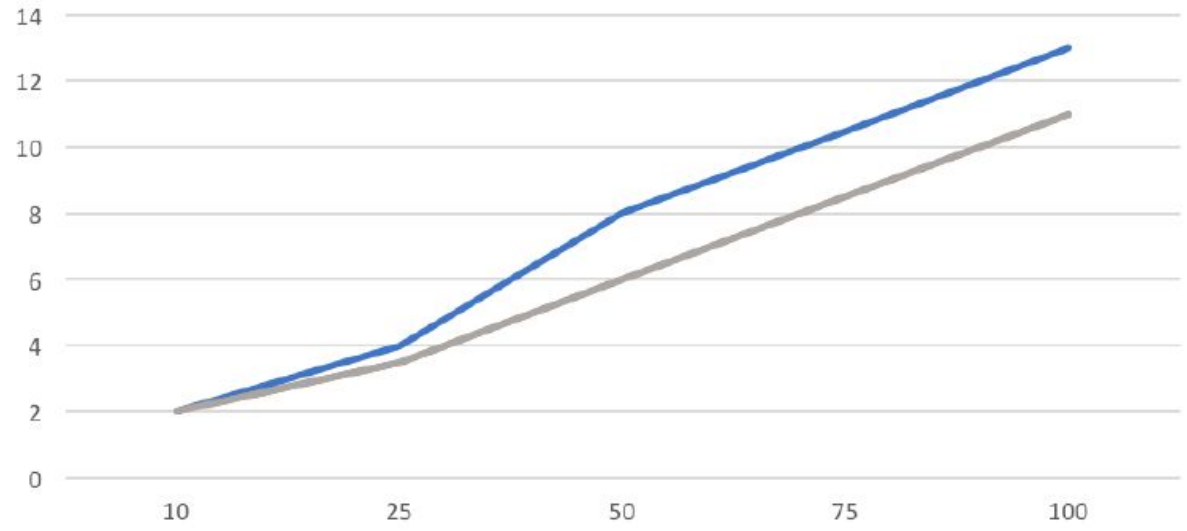
In this experiment, we built the given circuit then changed the R2 and measured the output voltage. In the table below you can see out measurements where input voltage is 350mV.

R2	Output Amplitude
100K	3.9V
75K	3V
50K	2.1V
25K	1.25V
10K	700mV

Here the LTspice graph of Vin and Vout.



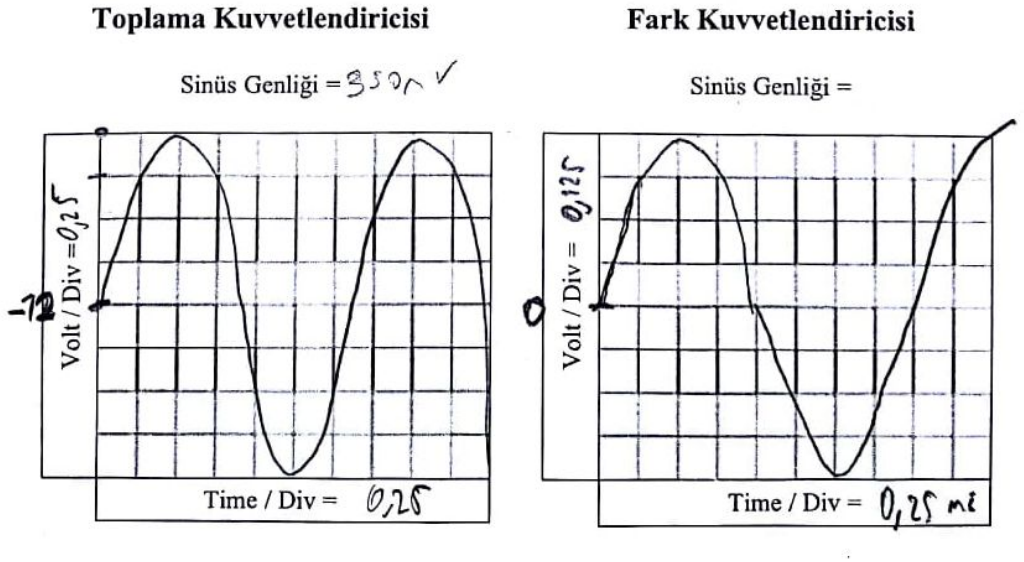
Here is the experimental and simulated graph. Blue line is experimental and gray one is LTspice simulation.



If R2 is 0 and R1 is infinite then the term 1 + R2/R1 will be 1, we can say that Vout/Vin will be 1 and expected output value will be same as input value.

2.3. Experiment-2.3

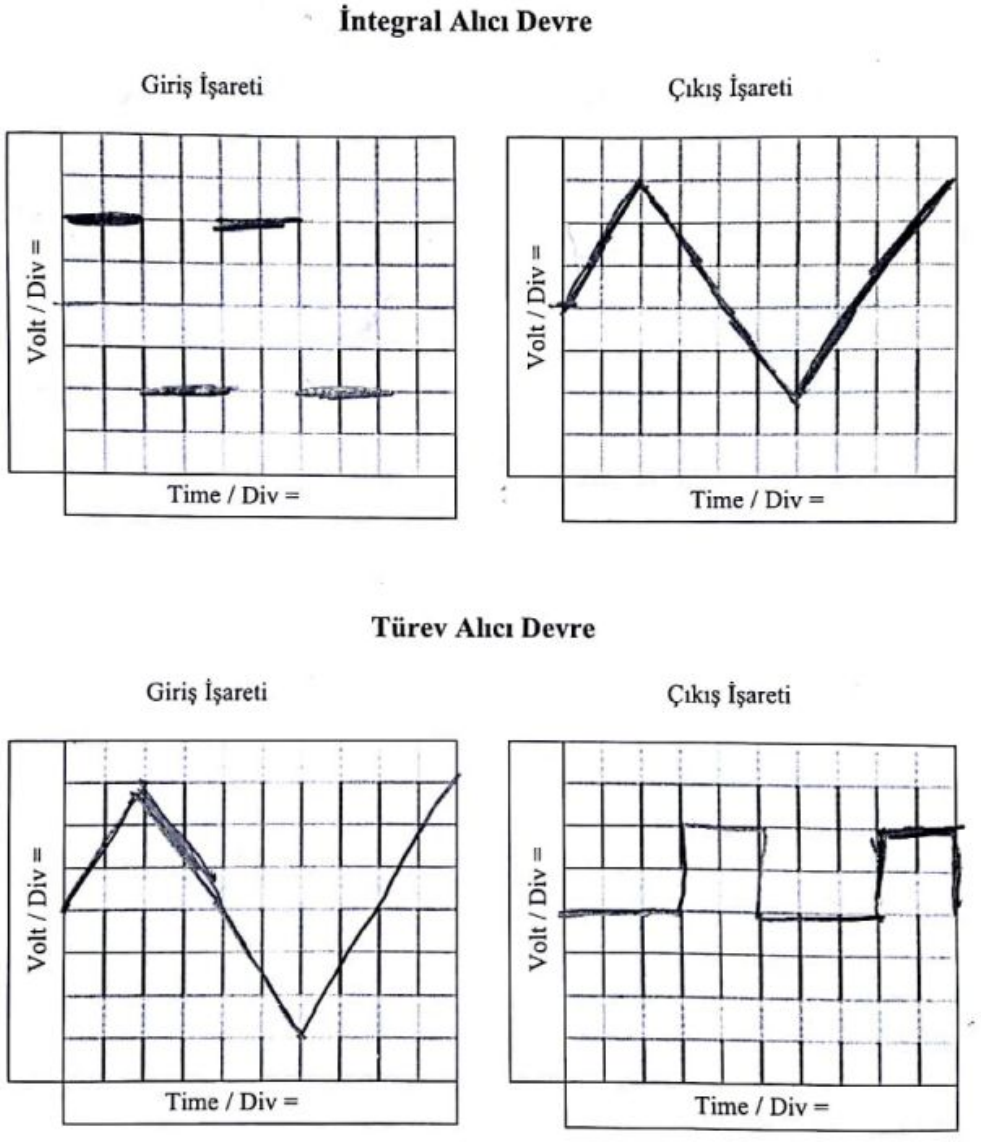
In this experiment, we built the circuit and measured the output. We picked R3 as 8.2K ohm, R1 as 2.7 ohm and R2 as 8.2 ohm. The result expected as expected 3V1 + 1V2 and negative phase.



2.4. Experiment-2.4

In this experiment we built the given integrator and differentiator circuits. For integrator, input signal was square wave and for differentiator input was triangle wave.

The expected outputs were triangle wave for integrator circuit and square wave for differentiator circuit.



3. Terms

Ortak İşareti Bastırma Oranı(Common Mode Rejection Ratio): The CMRR(Common Mode Rejection Ratio) is the most important specification and it indicates the how much of the common mode signals will present to measure.

Birim Kazanç Bant Genişliği(Unity Gain Bandwidth): The unity-gain bandwidth of an op amp is the entire range of frequencies in which an op amp can produce gain. An op amp is able to amplify sound only through a certain range of frequencies. Once it reaches its maximum frequency in which it was designed to handle, it will then produce no gain at all after this frequency.

Yükselme Eğimi(Slew Rate): The maximum rate at which an amplifier can respond to an abrupt change of input level.

Besleme Gerilimi Seviyesi Çıkış(Rail to Rail): ST's rail-to-rail operational amplifier portfolio includes several series covering different voltage ranges, as well as many possible combinations of power consumption and gain bandwidth, allowing customers to get the best performance for the appropriate accuracy.

4. Results

In this experiment, we implemented several circuits with op-amps and observed their effects to input signal and compared the measurements with theoric results. It was good experiment for reinforcing the knowledge of electronics.