Heaven's Light is Our Guide

Rajshahi University of Engineering & Technology

Department of Electrical & Computer Engineering

Course Title: Digital Signal Processing Sessional

Course No. : ECE 4124

Submitted by:

Name: Anika Nawer
Roll: 1810012
Submission Date: 22-05-2023

Submitted to:

Hafsa Binte Kibria
Lecturer
Dept. of ECE
RUET

Experiment No: 03

Experiment Date: 15.05.23

Experiment Name: Study of Identifying delay using correlation.

Objective: The main objective of this experiment is to apply correlation for estimating time delay between signals.

Theory: The correlation is regarded as the most popular approach for estimating the time difference of arrival[1] between the signals. Time delay estimates are obtained by maximizing the correlation output, where the direct-path delay is usually observed as a prominent peak.

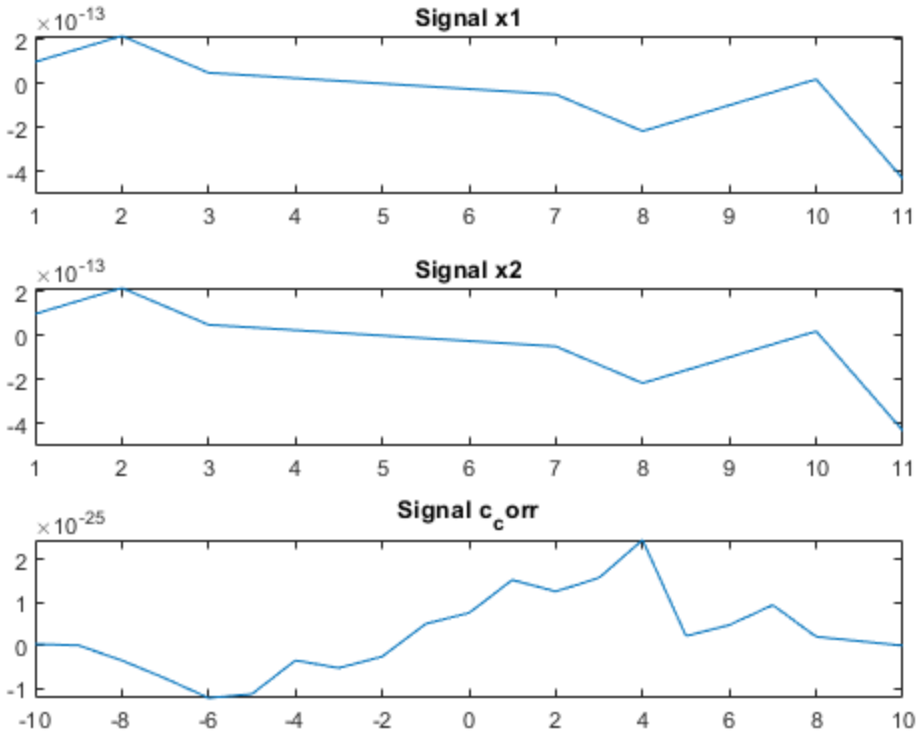
Required Platform: MATLAB

Code with figure:

```
clc;

clear all;
close all;

t= 0:1:10;
A=10;
f=10;
x1=A*sin(2*f*pi*(t-4));
x2=A*sin(2*f*pi*t);
z=xcorr(x1,x2);
[c_corr, lags] = xcorr(x1,x2)
subplot(3,1,1);
plot(x1);
title('Signal x1');
subplot(3,1,2);
plot(x1);
title('Signal x2');
subplot(3,1,3);
plot(lags,c_corr);
title('Signal c_corr');
[~, index] = max(c_corr);
delay_sample = abs(lags(index))
Fs=1;
delay_seconds = delay_sample/Fs
```



Discussion:

In this experiment we have implemented correlation to identify the time delay of signals. We got the time delay at where the peak value was obtained.

Conclusion: The experiment was successful as we got our delay time at peak value as expected and no error was encountered.

References:

[1]*"identifying time delay*",knowledge.ni,2023. [Online]. Available: https://knowledge.ni.com/KnowledgeArticleDetails?id=kA00Z000001DdeeSAC&l=en-US. [Accessed:21-May- 2023].