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Study of Identifying delay using correlation.

3 | Introduction

In correlation, if the correlation between a signal & its delayed copy is calculated then maximum magnitude will be obtained at a delayed time. That is, the peak of the correlation function occurs at the lag with the best similarity between the two signals, i.e. the estimated delay. [1]

4 | Objectives

The main objectives of this experiment were:

- To develop an algorithm to identify the delay time of a given function.

5 | Equipment Required

MATLAB

6 | Matlab Code

Here is the input code of above experiments-

6.1 | Identifying Delay

```
A=0.3171;
t=-20:1:20;
x1=square(3*A*t);
noise=rand();
x2=square(3*A*(t+5))+noise;
[corr,t]=xcorr(x1,x2)
mag=max(corr(:))
delay=find(corr(:)==mag);
if delay>40
    k=delay-41;
end
if delay<40
    k=40-delay;
end
```

7 | Result & Discussion

Here is the outcome of above code-

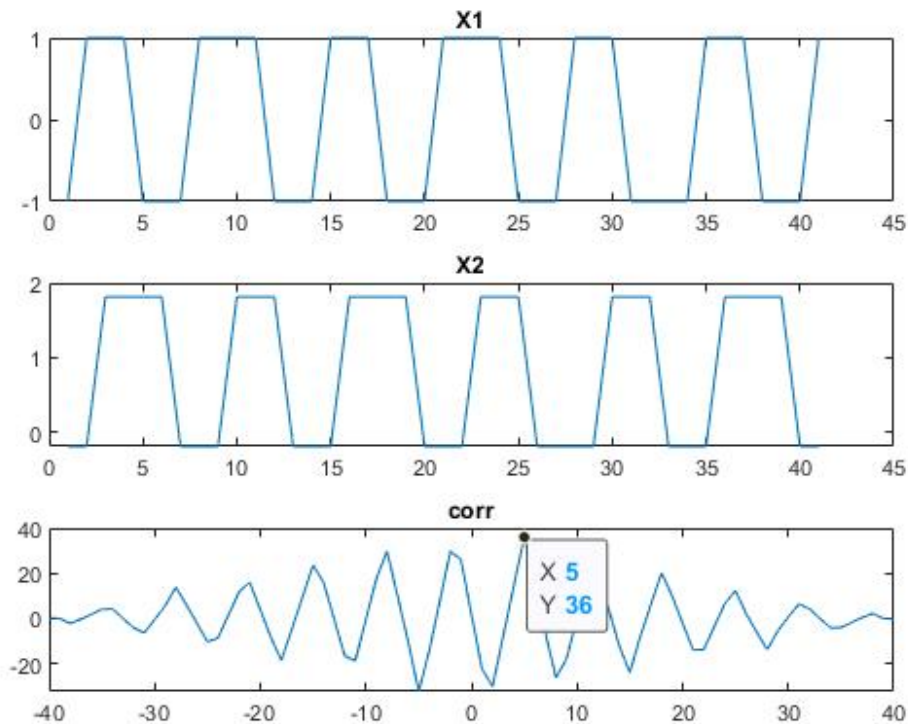## 7.1 | Plotting for identifying delay signal

Figure 7.1: Graphical Plot delay signal

The outcomes of this experiment were achieved as desired. We used the correlation method to identify the delay time of a signal, where a second signal was generated by delaying the input signal. And the delay was included by adding zeros from the beginning of an array for padding. We observed that the peak value was obtained at the time of delay from Fig. 7.1.

8 | Conclusion

The experiment was successful & we did not encounter any error while running the ***Matlab*** code.

9 | References

[1] Understanding Correlation - Technical Articles, 1 2017.