AMERICAN INTERNATIONAL UNIVERSITY-BANGLADESH

Course: DATA COMMUNICATION
Session: Fall 2022-2023

Experiment No: 08

Experiment Title: Study of Frequency Modulation and Demodulation using Simulink (MATLAB).

Section: I
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Abstract:

This exercise aims to clarify how Simulink may be used to solve issues with communication engineering. Become familiar with frequency using Simulink for modulation and demodulation.

Theoretical Background:

If m(t) is message signal, the frequency modulated signal is expressed as in time domain:

$$s(t) = A_c \cos \left[2\pi f_c t + K_f \int_{-\infty}^{t} m(\lambda) d\lambda \right]$$

Frequency Demodulation Phase Locked Loop (PLL) Demodulation: The PLL demodulates the FM signal using the R of the incoming signal. The message is recovered as the control input of the VCO [2]. In the simulation experiment (section 2), we used the VCO to demodulate the information signal.

Building Simulink Model of Frequency Modulation and Demodulation:

The structures of the frequency modulator and demodulator are described below. You are given an FM structure for the first model, which is fairly similar to the experiment's theoretical setting. You can see the Simulink-provided PLL frequency demodulator blocks in the second model.

Results:

Given,
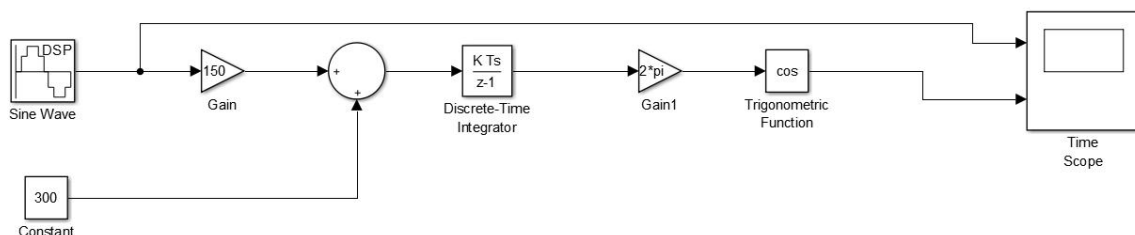Message signal, m(t) = a*sin(2πf$_m$t + π/3), a = 2, f$_m$ = 10.
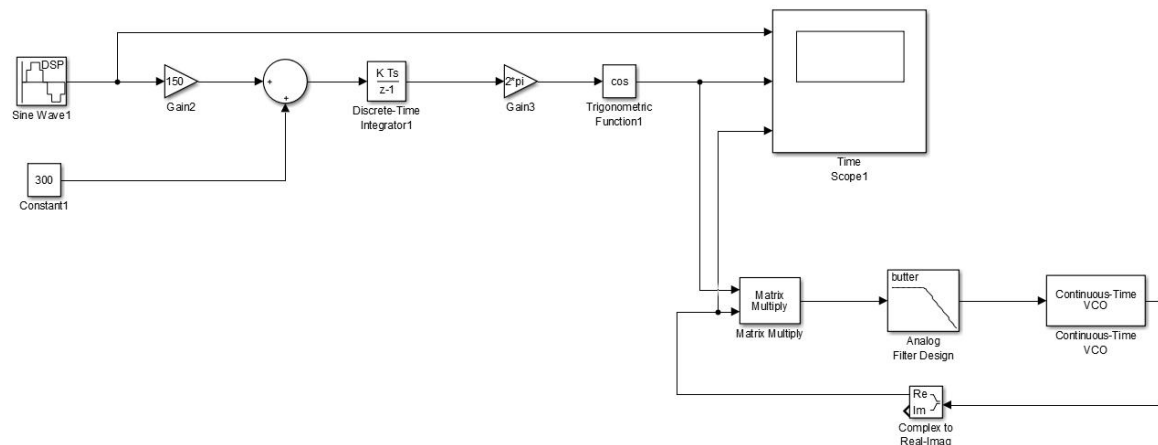

Figure 01: Block diagram of FM modulator
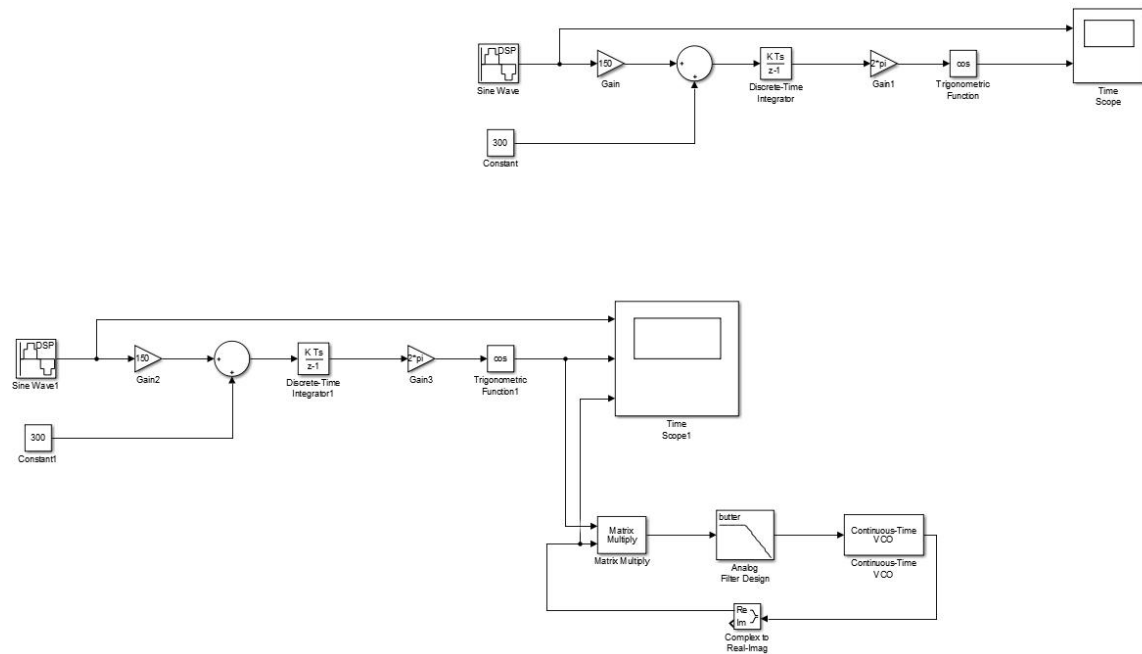
Figure 02: Block diagram of FM Demodulator

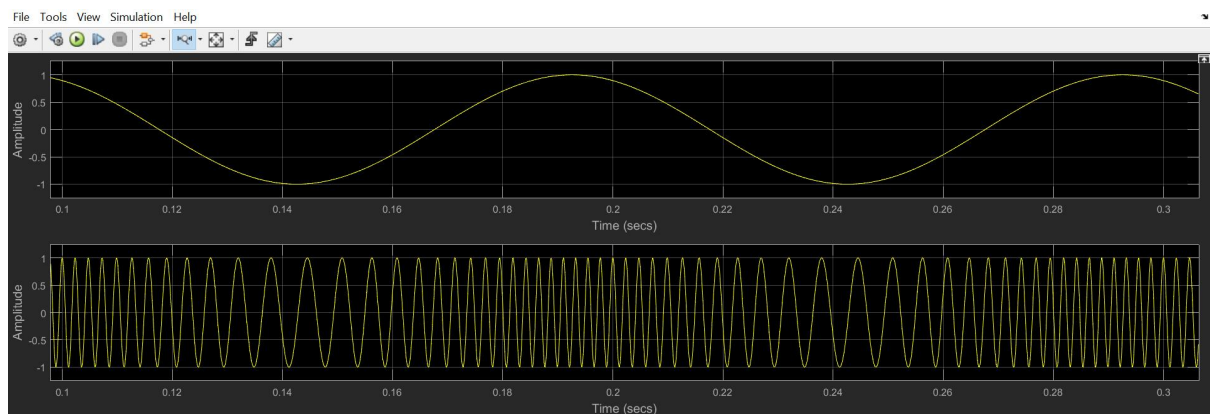Figure 03:block diagram of FM modulator and demodulator in a single window
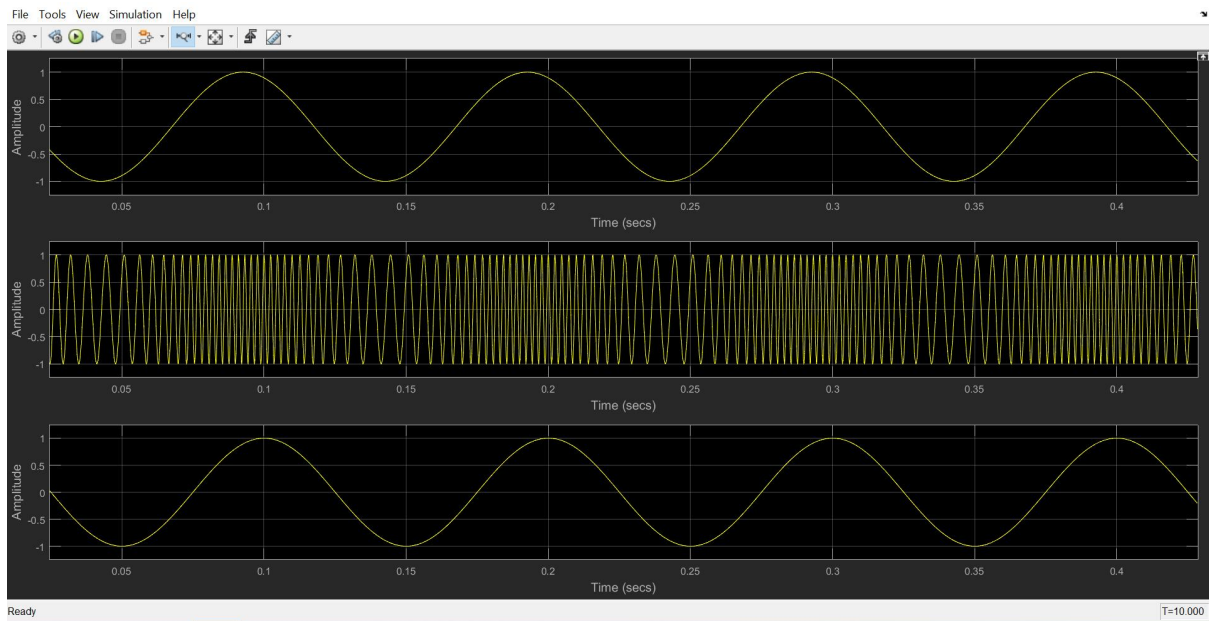

Figure 04: Modulation with time scope

Figure 05: Demodulation with time scope

Discussion and Conclusion:

In this experiment, MATLAB was utilized to resolve communication engineering issues and to comprehend resolution of issues. Simulink is used in this experiment to solve communication engineering difficulties. Using Simulink, gain knowledge of frequency modulation and demodulation. Some grammatical mistakes were made while doing this experiment. Expect absolute value to appear and for everything to be in its proper place.

References:

1. Forouzan, B. A. "Data Communications and Networking", 4th edition.
2. Agarwal, Rajneesh "Data Communication and Computer Networks."
3. Prakash C. Gupta, "Data communications", Prentice Hall India Pvt.