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194107 / ECE-A

Communication LAB

Exp. Pulse Position Modulation (PPM)

Aim:- To develop a MATLAB program for Pulse Position modulation of a given message signal.

Tools Used:- MATLAB 2021b.

Theory:- PPM is particularly attractive for communication at optical frequencies because the optical energy source can be operated at low, message-independent duty cycle to extend the lifetime of the devices, and the technique affords high noise immunity.

In a PPM system, the position of the pulse relative to zero reference level, is varied in accordance with the instantaneous value of modulating signal. Amplitude and width of the pulse are kept constant. In this system, position of each pulse is related to the position ~~are kept constant. In this system, the posn of~~ each of the recurrent reference pulse. The N message bits are encoded by transmitting a single pulse in one of 2N possible time shifts. This is repeated every T seconds, such that the transmitted bit rate is N/T bits per seconds.

This is mainly used in radio communication, control of aircrafts, cars, etc.

One of the several ways in which PPM can be ~~used~~ produced is by using a PWM generator and then differentiating the PWM signal.

The sawtooth waveform and a comparator produce the PWM signal which is then differentiated to get a PPM signal.

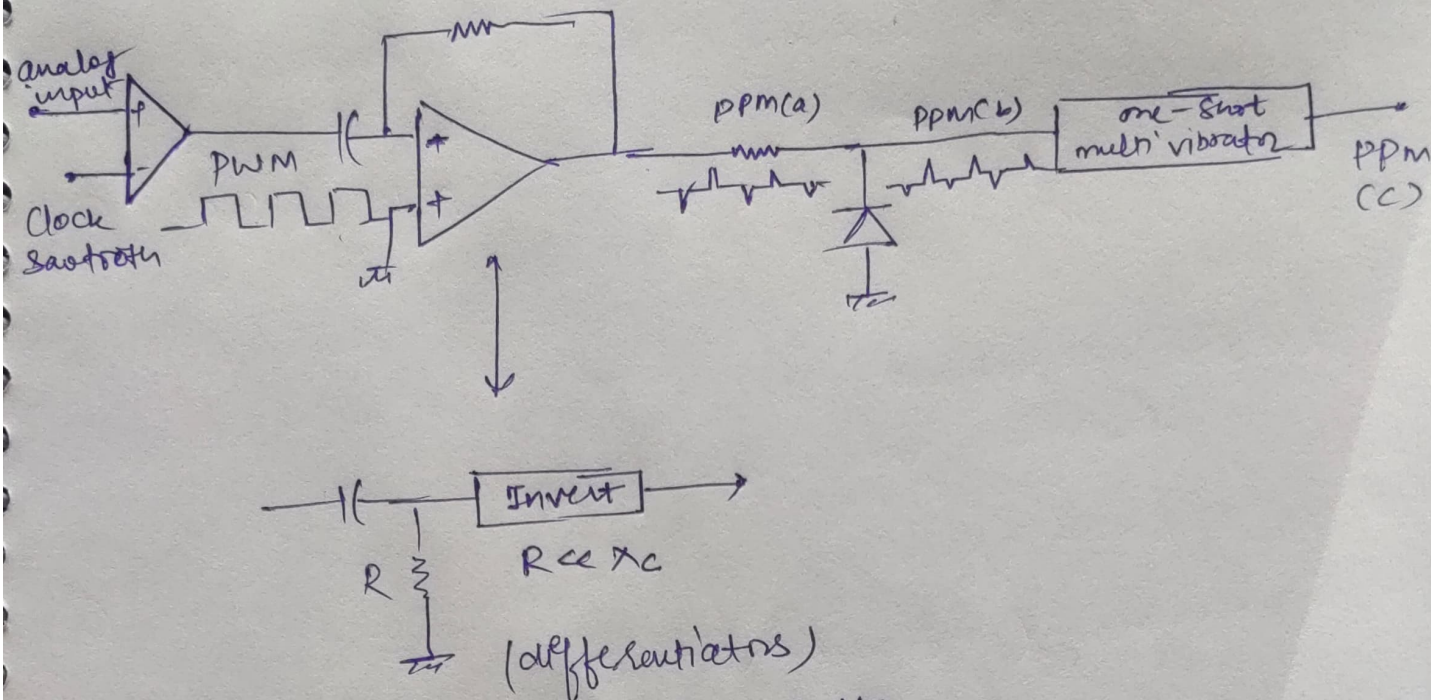
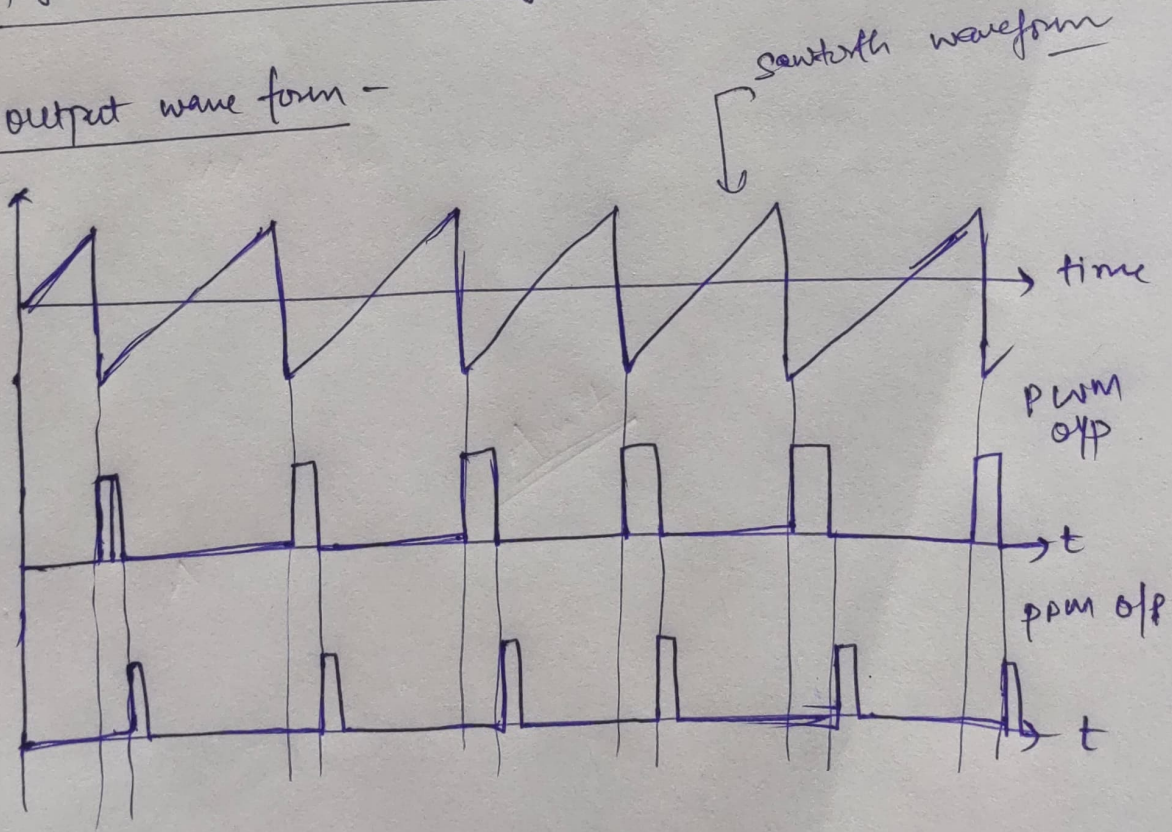


fig 1. PPM CKT using PWM.

PPM output wave form -



Result:- The MATLAB program for PPM of two signals was developed and the plot were obtained successfully.

```
clc;
close all;

fc=1000; %CARRIER FREQUENCY
fs=10000; %SAMPLING FREQUENCY
fm=200; %MESSAGE FREQUENCY

t=0:1/fs:((2/fm)-(1/fs));

% MESSAGE SIGNAL
X= 0.4*cos(2*pi*fm*t)+0.5;
% ppm MODULATED SIGNAL
Y= modulate(X,fc,fs,'PPM');
%%%%%%%%%%%%%%%%%%%%&&&&

subplot(3,1,1);
plot(X);
title('Message Signal');

subplot(3,1,2);
plot(Y);
axis([0 500 -0.2 1.2]);
title('PPM Modulated Signal');
xlabel('Time');
ylabel('Amplitude');

demoddi=demod(Y,fc,fs,'ppm');
subplot(3,1,3);
plot(demoddi);
title('PPM Demod');
xlabel('Time');
ylabel('Amplitude');
```

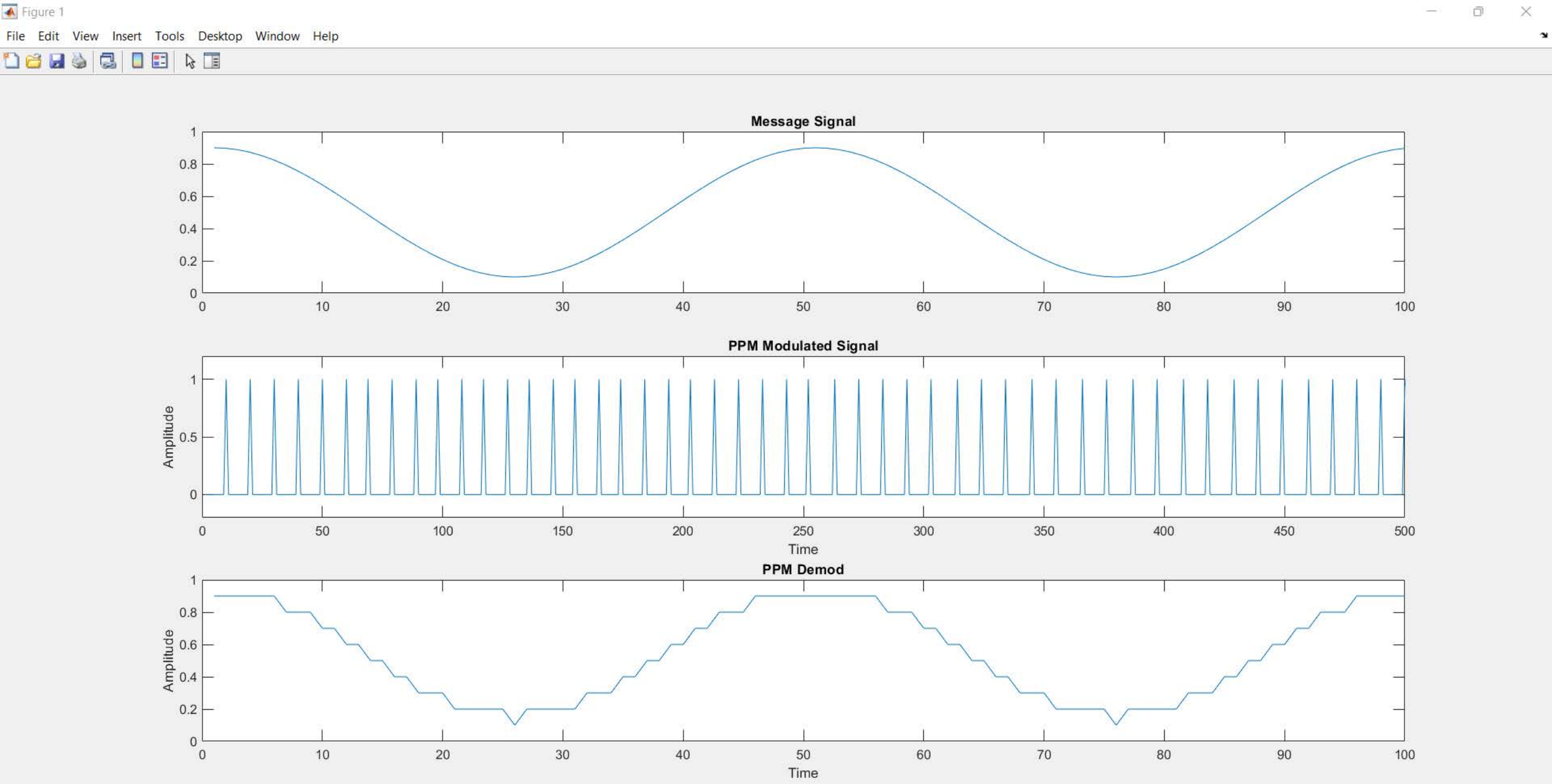


Figure 1
File Edit View Insert Tools Desktop Window Help
Message Signal
PPM Modulated Signal
Amplitude
Time
PPM Demod
Amplitude
Time