

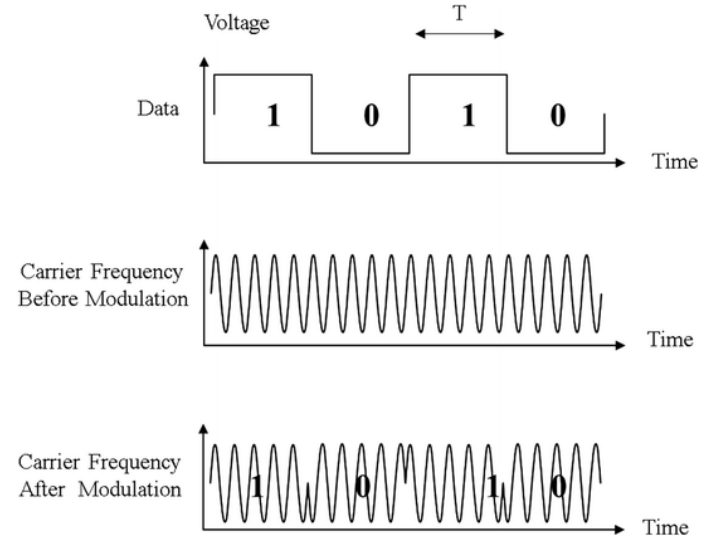
Problem Statement:

Write a MATLAB script to generate a binary PSK signal for a random base band data of 16 bits.

Assume the carrier frequency f_c as 1000Hz

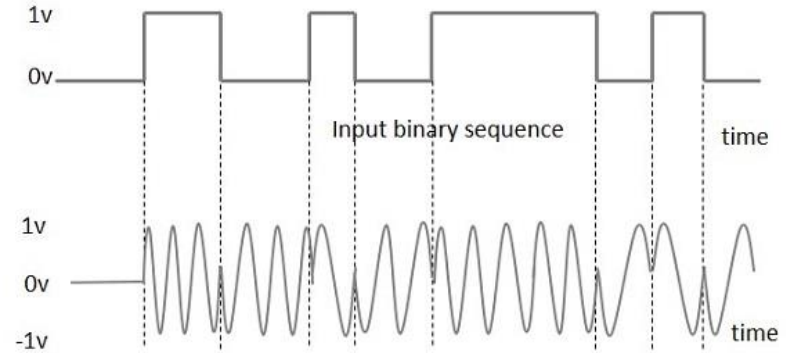
Phase shift keying (PSK)

PSK is the digital modulation technique in which the phase of the carrier signal is changed by varying the sine and cosine inputs at a particular time.



Binary PSK

BPSK is the simplest form of phase shift keying (PSK). It uses two phases which are separated by 180°



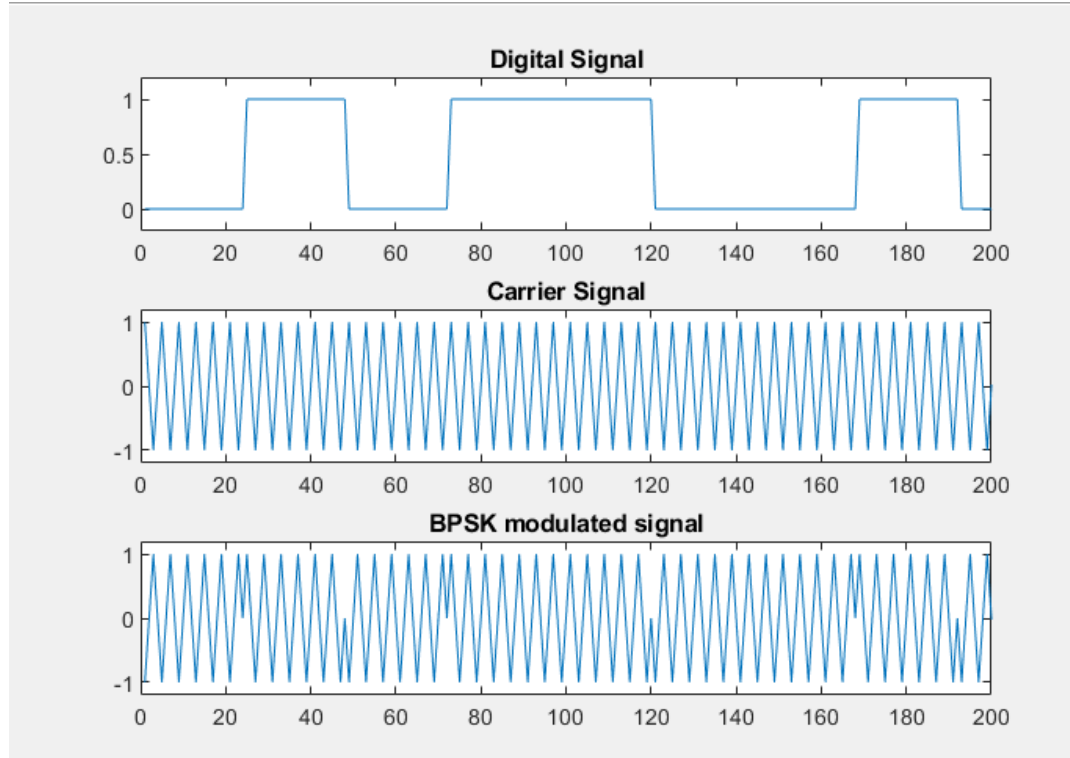
BPSK Modulated output wave

MATLAB Simulation

```
1 - nSamplePoints = 1000;
2 - rN = rand(1, nSamplePoints);
3 - rBinary = round(rN);
4
5 - Fc = 1000;
6 - Fs = 4;
7 - nCycles = 6;
8 - Tb = nCycles/Fc;
9 - t = 0:1/Fs:(nCycles-1/Fs);
10 - xC = cos(2*pi*t);
11
12 - A = 1;
13 - Eb = (A^2*Tb)/2;
14 - Eb_N0dB = 0 : 2 : 14;
15 - Eb_N0 = 10.^(Eb_N0dB/10);
16 - nVar = (Eb)./ Eb_N0;
17
18 - bitStream = [];
19 - carrierSignal = [];
20 - i = 1;
21
```

```
22 - while(i<=nSamplePoints)
23 -     if(rBinary(i))
24 -         bitStream = [bitStream ones(1,length(xC))];
25 -     else
26 -         bitStream = [bitStream zeros(1,length(xC))];
27 -     end
28 -     carrierSignal = [carrierSignal A*xC];
29 -     i = i+1;
30 - end
31
32 - bits = 2*(bitStream-0.5);
33 - bpskSignal = carrierSignal.*bits;
34 - plot(bits);
35 - xlim([0 300]); ylim([-1.2 1.2]);
36
37 - figure(1);
38 - subplot(3,1,1); plot(bitStream); title('Digital Signal');
39 - xlim([0 200]); ylim([-0.2 1.2]);
40 - subplot(3,1,2); plot(carrierSignal); title('Carrier Signal');
41 - xlim([0 200]); ylim([-1.2 1.2]);
42 - subplot(3,1,3); plot(bpskSignal); title('BPSK modulated signal');
43 - xlim([0 200]); ylim([-1.2 1.2]);
```

MATLAB Output



Thank you