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## Exp7.m

```
1 clc;
 2 clear all;
 3 close all;
 4 k=input('enter the no of bits');
 6 M = 2^k;
 7 N = k*10^3;
 8 k = log2(M);
 9 a = [0:M-1]*2*pi/M;
10 SNRdB = [0:2:20];
11 sdB = SNRdB + 10*log10(k);
12
13 b = [0:M-1];
14 map =bitxor(b,floor(b/2));
15 [tt ind] = sort(map);
16 c = zeros(1,N);
17 for i = 1:length(SNRdB)
18 bits = rand(1,N*k,1)>0.5;
19
20 bin2DecMatrix = ones(N,1)*(2.^((k-1):-1:0));
21 shape= reshape(bits,k,N).';
22
23 G= (sum(shape.*bin2DecMatrix,2)).';
24
25 dec = ind(G+1)-1;
26 ph= dec*2*pi/M;
27
28 d= exp(1i*ph);
29 \ s = d;
30
31 n = 1/sqrt(2)*(randn(1,N) + 1i*randn(1,N));
32
33 r = s + 10^{(-sdB(i)/20)*n};
34
35 e = angle(r);
36
37 e(e<0) = e(e<0) + 2*pi;
38 c = 2*pi/M*round(e/(2*pi/M));
39 c(c==2*pi) = 0;
40 cd = round(c*M/(2*pi));
41
42 f = map(cd+1);
43 cb = dec2bin(f,k);
44 cb = cb.';
45 cb = cb(1:end).';
46 cb = str2num(cb).';
47
48 Err(i) = size(find(bits- cb),2);
49 end
50 sBer=Err/(N*k);
51 tBer = (1/k) * erfc(sqrt(k*10.^(SNRdB/10)) * sin(pi/8));
52
53 figure
54 semilogy(SNRdB, tBer, 'rs-', 'LineWidth', 2);
55 hold on
56 grid on
57 semilogy(SNRdB,sBer,'kx-','LineWidth',2);
58 legend('theory','simulation');
59 xlabel('SNR dB')
60 ylabel('Bit Error Rate')
61 title('BER VS SNR M-PSK')
```

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