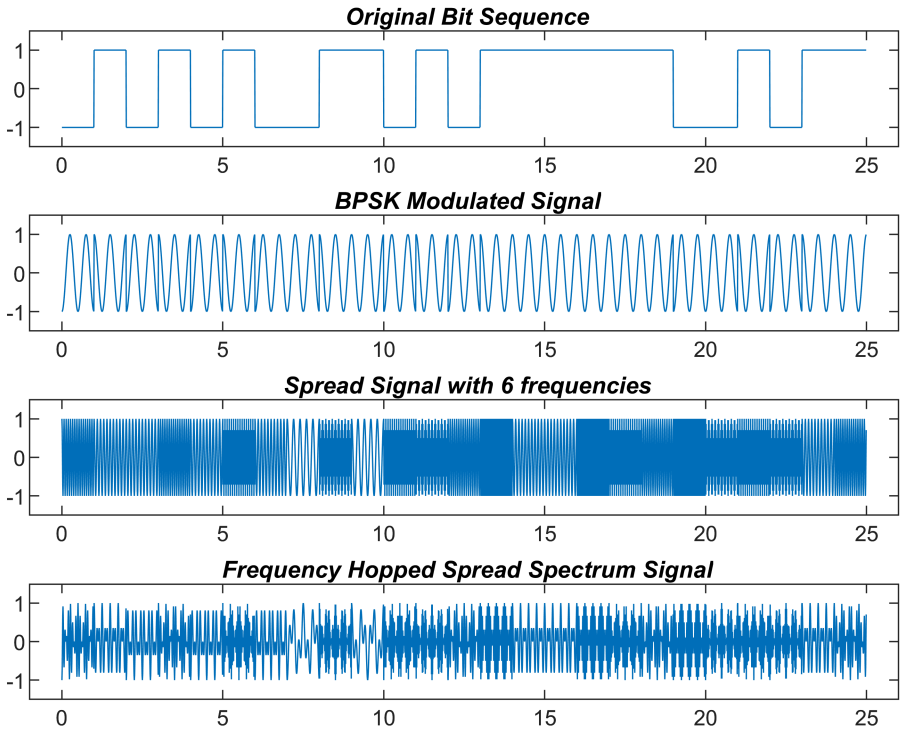
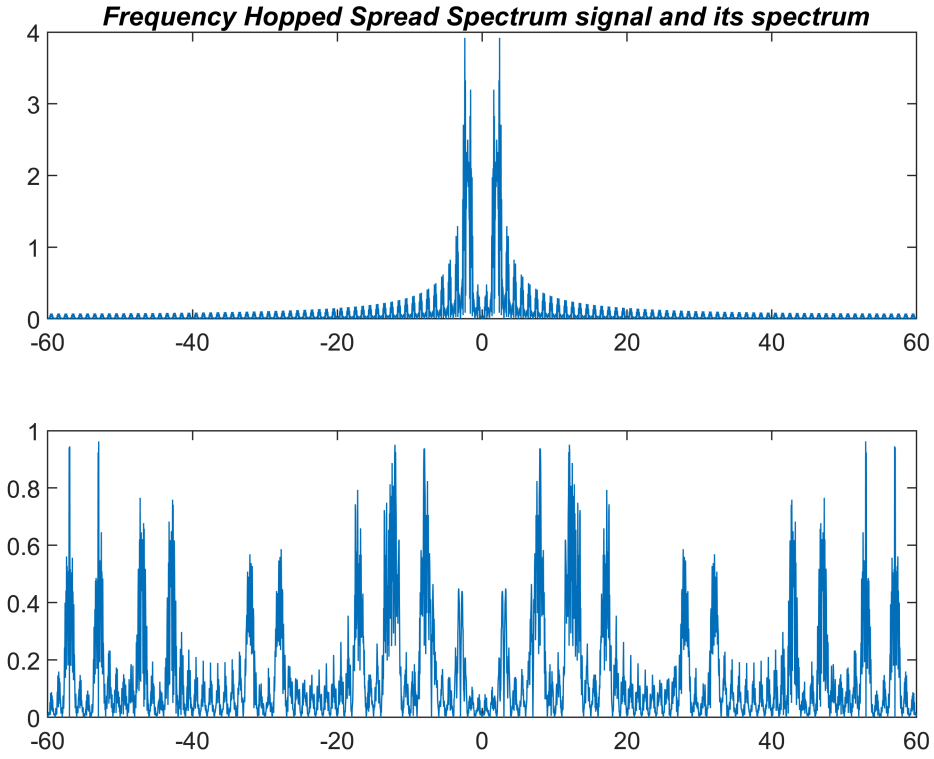
```
%FHSS.m
%Frequency Hopping Spread Spectrum
clc; clearvars;
close all;

%Generating bit pattern
polar= round(rand(1,25));    %20 bits
signal= [];
%carr= [];
fs= 120;
T= 1/fs;
Ng= 120;  %sample length
iter= 25;
tg= (0:T:1-T);
for k= 1:iter %loop to generate a long code of binary bits for 25 times
    if polar(1,k)== 0
        sig= -ones(1,Ng);    %bit "0"
    else
        sig= ones(1,Ng);     %bit "1"
    end
    signal= [signal sig];
end
t= (0:T:iter-T);
fc0= 2; car= cos(2*pi*fc0*t);
figure(1), subplot(411);
plot(t, signal);
axis([-1 26 -1.5 1.5]);
title('\bf\it Original Bit Sequence');

% BPSK Modulation of the signal as Input to Spectral Spreader
bpsk_sig= signal.*car;   % Modulating the signal
subplot(412);
plot(t, bpsk_sig)
axis([-1 26 -1.5 1.5]);
title('\bf\it BPSK Modulated Signal');

% Preparation of 6 new carrier frequencies
car1= cos(2*pi*5*tg);
car2= cos(2*pi*10*tg);
car3= cos(2*pi*15*tg);
car4= cos(2*pi*30*tg);
car5= cos(2*pi*45*tg);
car6= cos(2*pi*55*tg);
%Random frequency hopps to form a spread signal
sprSignal=[];
for n= 1:iter
    c= randi([1 6],1,1);
    switch(c)
        case(1)
            sprSignal= [sprSignal car1];
        case(2)
            sprSignal= [sprSignal car2];
        case(3)
```

```
            sprSignal= [sprSignal car3];
        case(4)
            sprSignal= [sprSignal car4];
        case(5)
            sprSignal= [sprSignal car5];
        case(6)
            sprSignal= [sprSignal car6];
    end
end
subplot(413)
plot(t,sprSignal);
axis([-1 26 -1.5 1.5]);
title('\bf\it Spread Signal with 6 frequencies');
% Spreading BPSK Signal into wider band with total of 12 frequencies
fhSignal= bpsk_sig.*sprSignal;
subplot(414)
plot(t,fhSignal);
axis([-1 26 -1.5 1.5]);
title('\bf\it Frequency Hopped Spread Spectrum Signal');
```

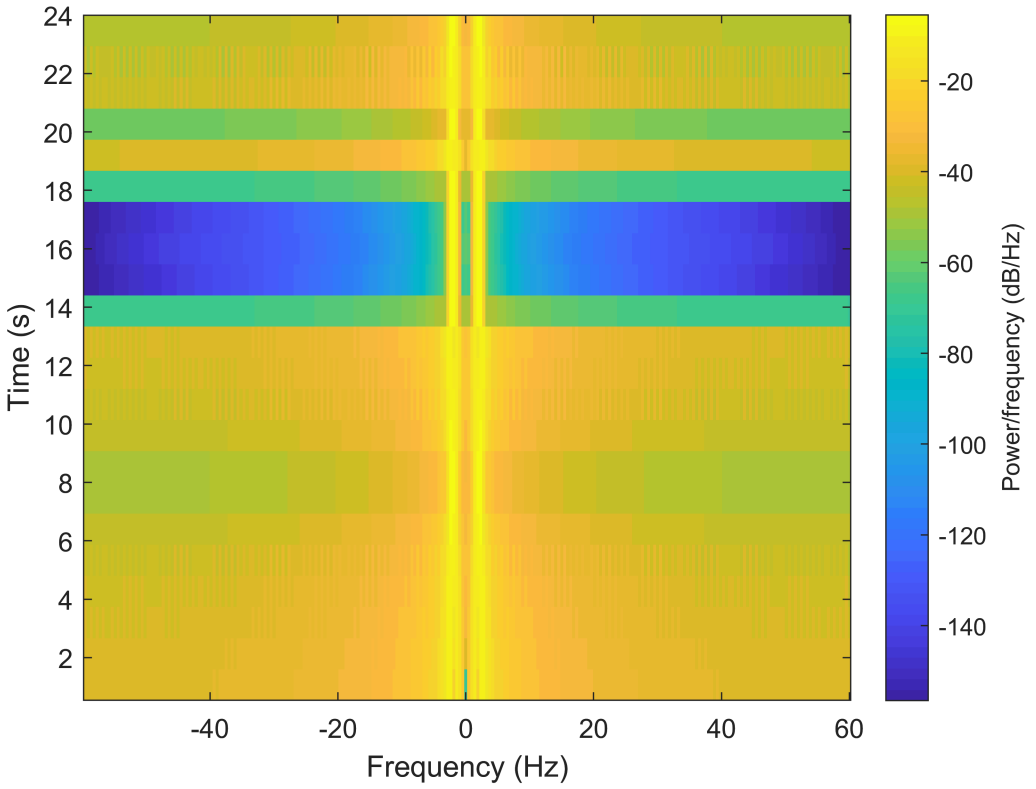



```
%Estimating Spectrum of signals
bpskMag= fftshift(T*fft(bpsk_sig));
fhssMag= fftshift(T*fft(fhSignal));
fd= 1/(length(t)*T);
f= (0:fd:(length(t)/2-1)*fd);
freq= (-length(t)/2:(length(t)/2-1))*fd;
% Expressing the FFTs
```

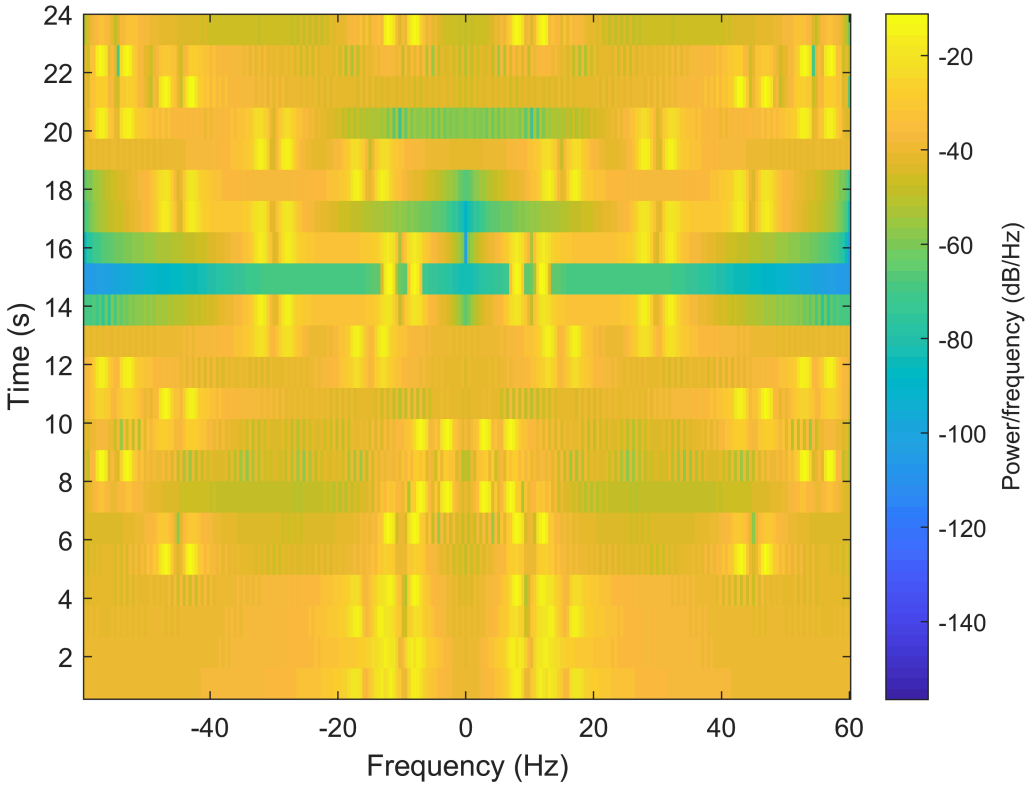
```
figure(2), subplot(211)
plot(freq, abs(bpskMag));
%axis([-1 26 -1.5 1.5]);
title('\bf\it Frequency Hopped Spread Spectrum signal and its spectrum');
subplot(212); plot(freq, abs(fhssMag));
```




```
figure(3),
spectrogram(bpsk_sig,blackman(2^8), round(0.5*2^8), 2^8, fs, 'centered');
```




```
figure(4),
spectrogram(fhSignal,blackman(2^8), round(0.5*2^8), 2^8, fs, 'centered');
```



```
%spectrogram(fhSignal, fs);
```