EXP 7 ***POWER SPECTRAL DENSITY***

28/7/14

AIM:

To obtain the power spectral density of a sinusoidal signal in matlab.

PROGRAM:

clc;

clear all;

close all;

Fs = 1000;

T = 1/Fs;

L = 1000;

t = (0:L-1)\*T; % Time vector

% Sum of a 50 Hz sinusoid and a 120 Hz sinusoid

x = cos(2\*pi\*50\*t) + cos(2\*pi\*120\*t);

figure% Sinusoids plus noise

set(gca, 'FontSize', 16)

plot(Fs\*t(1:50),x(1:50))

title('Signal without noise')

xlabel('time (milliseconds)')

NFFT = 2^nextpow2(L); % Next power of 2 from length of y

Y = fft(x,NFFT)/L;

Y=Y.\*conj(Y);

f = Fs/2\*linspace(0,1,NFFT/2+1);

% Plot single-sided amplitude spectrum.

figure

set(gca, 'FontSize', 16)

plot(f,2\*abs(Y(1:NFFT/2+1)))

title('Amplitude Spectrum of x(t)')

xlabel('Frequency (Hz)')

ylabel('|X(f)|');

y = x + 2\*randn(size(t));

figure% Sinusoids plus noise

set(gca, 'FontSize', 16)

plot(Fs\*t(1:50),y(1:50))

title('Signal Corrupted with Zero-Mean Random Noise')

xlabel('time (milliseconds)')

NFFT = 2^nextpow2(L); % Next power of 2 from length of y

Y = fft(y,NFFT)/L;

Y=Y.\*conj(Y);

f = Fs/2\*linspace(0,1,NFFT/2+1);

% Plot single-sided amplitude spectrum.

figure

set(gca, 'FontSize', 16)

plot(f,2\*abs(Y(1:NFFT/2+1)))

title('Amplitude Spectrum of y(t)')

xlabel('Frequency (Hz)')

ylabel('|Y(f)|');







RESULT:

Thus the power spectral density of the signal is obtained.