APPENDIX

Berikut merupakan kode berbasis MATLAB menggambar *plot* kawasan waktu dan frekuensi dengan benar dari suatu isyarat :

```
%% Code by Gabriel, Electrical Engineering Department
%% Gadjah Mada University
%% Example of basic sine wave and its proper representation in time and
frequency domain (one & two sided)
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%%%%%%%%%%%%%%
%% Time Domain
Fs=1;                  % Sampling frequecy (default sampling freq of MATLAB is 1
Hz, you want to change this value if you use high frequency signal)
L=200;                 % Signal length (time observation)
T = 1/Fs;              % Sampling period
t = (0:L-1)*T;         % Time vector
P=2*sin(2*pi*0.2*t);                    %sine wave generation
P_fft=fft(P);                           %Fourier Transfrom (FFT algorithm)
process
P_fft_magnitude=abs(P_fft)./L;          %magnitude view and scaling
%plotting 1
figure(1)
plot(t,P)
title('Time Domain')
xlabel('Time (seconds)')
ylabel('Amplitude (Volt or Ampere)')
%% Frequency Domain - Two Sided View
P_fft_double=fftshift(P_fft_magnitude);     % FFT shifting for proper
representation from -pi to pi
axis_double=(-L/2:L/2-1)*(Fs/L);            % x-axis for two sided spectrum
%plotting 2
figure(2)
plot(axis_double,P_fft_double)
title('Two Sided Freq Domain');
xlabel('Frequency (Hz)')
ylabel('Magnitude (Volt or Ampere)')
%% Frequency Domain - One Sided View
P_fft_single=P_fft_magnitude(1:(0.5*L)+1);              % take first half of
freq domain
P_fft_single(2:(0.5*L)+1)=2*P_fft_single(2:(0.5*L)+1); % double the magnitude
axis_single=(0:L/2)*(Fs/L);                             % x-axis for one sided
spectrum
%plotting 3
figure(3)
plot(axis_single,P_fft_single)
title('One Sided Freq Domain');
xlabel('Frequency (Hz)')
ylabel('Magnitude (Volt or Ampere)')
%% IMPORTANT NOTES!
% 1. Pay attention to the coherency of magnitude between two domains, true
% transformation doesn't change the value of the magnitude
% 2. Fine representation of freq domain depends on sampling freq and length
% of signal
% 3. Default freq window of freq domain in MATLAB spans from 0 to 2*pi*1 rad/s
% which corresponds 0 to 1 Hz (usually normalized/changed to -0.5 to 0.5 Hz)
% 4. Key for configuring x axis is to make sure that its length is the same as
the signal you want to plot
```

Berikut merupakan kode berbasis SCILAB menggambar *plot* kawasan waktu dan frekuensi dengan benar dari suatu isyarat :

```
//% Code by Gabriel, Electrical Engineering Department
//% Gadjah Mada University
//% Example of basic sine wave and its proper representation in time and frequency domain (one & two sided)
//%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
//% Time Domain
Fs = 1;// Sampling frequecy (default sampling freq of MATLAB is 1 Hz, you want to change this value if you use high frequency signal)
L = 200;// Signal length (time observation)
T = 1/Fs;// Sampling period
t = (0:L-1)*T;// Time vector
P = 2*sin(((2*%pi)*0.2)*t);//sine wave generation
P_fft = mtlb_fft(P);//Fourier Transfrom (FFT algorithm) process
P_fft_magnitude = abs(P_fft) ./L;//magnitude view and scaling
//plotting 1
figure(1)
plot2d(t,P)
title("Time Domain")
xlabel("Time (seconds)")
ylabel("Amplitude (Volt or Ampere)")
//% Frequency Domain - Two Sided View
P_fft_double = fftshift(P_fft_magnitude);// FFT shifting for proper representation from -pi to pi
axis_double = ((-L)/2:L/2-1)*(Fs/L);// x-axis for two sided spectrum
//plotting 2
figure(2)
plot2d(axis_double,P_fft_double)
title("Two Sided Freq Domain");
xlabel("Frequency (Hz)")
ylabel("Magnitude (Volt or Ampere)")
//% Frequency Domain - One Sided View
P_fft_single = P_fft_magnitude(1:0.5*L+1);// take first half of freq domain
P_fft_single = mtlb_i(P_fft_single,2:0.5*L+1,2*mtlb_double(mtlb_e(P_fft_single,2:0.5*L+1)));// double the magnitude
axis_single = (0:L/2)*(Fs/L);// x-axis for one sided spectrum
//plotting 3
figure(3)
plot2d(axis_single,P_fft_single)
title("One Sided Freq Domain");
xlabel("Frequency (Hz)")
ylabel("Magnitude (Volt or Ampere)")
//% IMPORTANT NOTES!
// 1. Pay attention to the coherency of magnitude between two domains, true
// transformation doesn''t change the value of the magnitude
// 2. Fine representation of freq domain depends on sampling freq and length
// of signal
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// 4. Key for configuring x axis is to make sure that its length is the same as
// the signal you want to plot
```