LAMPIRAN

Script Matlab Pengambilan Data

Bantalan Normal

```
%Script to run data acquisition using National Instrument NI 9234
%Created: Oct 2016, Berli Kamiel

clear all;
clc;
close all;


tic;

s = daq.createSession('ni');
s.DurationInSeconds = 20;       %durasi rekaman
Dur = s.DurationInSeconds;
s.Rate = 51200;                 %sampling rate Hz
s.addAnalogInputChannel('cDAQ1Mod1', 'ai0', 'Accelerometer');
s.addAnalogInputChannel('cDAQ1Mod1', 'ai1', 'Accelerometer');

s.Channels(1).Sensitivity = 100.1E-3; %V/g Type 4507B serial:30171
s.Channels(2).Sensitivity = 97.60E-3; %V/g Type 4507B serial:11026


for i=1:30                      %  jumlah file yang diinginkan

data = s.startForeground();           % start recording vibration
data
data_ch1 = data(:,1);
data_ch2 = data(:,2);

rootname = 'E:\Tugas Akhir\Data\Bearing_Normal_Baru\Normal1000RPM';
% drive tujuan dan nama file
extension = '.mat';
% ekstension utk nama file
namafile = [rootname,'bearing',num2str(i),extension];
data_all = [data_ch1 data_ch2];
eval(['save ', namafile ,' data_all']);

pause(3)
pesan = ['Acquiring and saving data at loop number: ',num2str(i)];
disp(pesan)
end

toc
```

rootname : diganti tempat yang digunakan untuk menyimpan file.

Bantalan cacat elemen bola

```
%Script to run data acquisition using National Instrument NI 9234
%Created: Oct 2016, Berli Kamiel

clear all;
clc;
close all;


tic;

s = daq.createSession('ni');
s.DurationInSeconds = 20;       %durasi rekaman
Dur = s.DurationInSeconds;
s.Rate = 51200;                 %sampling rate Hz
s.addAnalogInputChannel('cDAQ1Mod1', 'ai0', 'Accelerometer');
s.addAnalogInputChannel('cDAQ1Mod1', 'ai1', 'Accelerometer');

s.Channels(1).Sensitivity = 100.1E-3; %V/g Type 4507B serial:30171
s.Channels(2).Sensitivity = 97.60E-3; %V/g Type 4507B serial:11026


for i=1:30                      %  jumlah file yang diinginkan

data = s.startForeground();           % start recording vibration
data
data_ch1 = data(:,1);
data_ch2 = data(:,2);

rootname = 'E:\Tugas Akhir\Data\Cacat Bola\BallBaru1000RPM';      %
drive tujuan dan nama file
extension = '.mat';
% ekstension utk nama file
namafile = [rootname,'bearing',num2str(i),extension];
data_all = [data_ch1 data_ch2];
eval(['save ', namafile ,' data_all']);

pause(3)
pesan = ['Acquiring and saving data at loop number: ',num2str(i)];
disp(pesan)
end

toc
```

rootname : diganti tempat yang digunakan untuk menyimpan file.

Script Domain Waktu Bantalan Normal

```
clear
clc
close

load('E:\Tugas
Akhir\Data\Bearing_Normal_Baru\Normal1000RPM\Normal1000RPMbearing15.
mat')
y1=data_all(:,1);
load('E:\Tugas
Akhir\Data\Bearing_Normal_Baru\Normal1200RPM\Normal1200RPMbearing15.
mat')
y2=data_all(:,1);
load('E:\Tugas
Akhir\Data\Bearing_Normal_Baru\Normal1400RPM\Normal1400RPMbearing15.
mat')
y3=data_all(:,1);
load('E:\Tugas
Akhir\Data\Bearing_Normal_Baru\Normal1600RPM\Normal1600RPMbearing15.
mat')
y4=data_all(:,1);
sampling_rate=51200; %kecepatan sampling Hz
recording_time=20;   %waktu perekaman data (recording time)
L=sampling_rate*recording_time;  %panjang data (length of signal)

% plot amplitude time domain
figure
subplot(2,2,1)
plot(y1(1:51200))
axis ([0 9000 -5 5])
title('a')
xlabel('Sampel')
ylabel('Amplitudo')
subplot(2,2,2)
plot(y2(1:51200))
axis ([0 7500 -5 5])
title('b')
xlabel('Sampel')
ylabel('Amplitudo')

% plot amplitude time domain
subplot(2,2,3)
plot(y3(1:51200))
axis ([0 6500 -5 5])
title('c')
xlabel('Sampel')
ylabel('Amplitudo')
subplot(2,2,4)
plot(y4(1:51200))
axis ([0 5500 -5 5])
title('d')
```

```
xlabel('Sampel')
ylabel('Amplitudo')
```

Script Domain waktu Bantalan Rusak Semua

```
clear
clc
close

load('E:\Tugas Akhir\Data\Cacat
Bola\BallBaru1000RPM\BallBaru1000RPMbearing15.mat')
y1=data_all(:,1);
load('E:\Tugas Akhir\Data\Cacat
Bola\BallBaru1200RPM\BallBaru1200RPMbearing15.mat')
y2=data_all(:,1);
load('E:\Tugas Akhir\Data\Cacat
Bola\BallBaru1400RPM\BallBaru1400RPMbearing15.mat')
y3=data_all(:,1);
load('E:\Tugas Akhir\Data\Cacat
Bola\BallBaru1600RPM\BallBaru1600RPMbearing15.mat')
y4=data_all(:,1);
sampling_rate=51200; %kecepatan sampling Hz
recording_time=20;   %waktu perekaman data (recording time)
L=sampling_rate*recording_time;  %panjang data (length of signal)

% plot amplitude time domain
figure
subplot(2,2,1)
plot(y1(1:51200))
axis ([0 9000 -60 60])
title('a')
xlabel('Sampel')
ylabel('Amplitudo')
subplot(2,2,2)
plot(y2(1:51200))
axis ([0 7500 -60 60])
title('b')
xlabel('Sampel')
ylabel('Amplitudo')

% plot amplitude time domain
subplot(2,2,3)
plot(y3(1:51200))
axis ([0 6500 -60 60])
title('c')
xlabel('Sampel')
ylabel('Amplitudo')
subplot(2,2,4)
plot(y4(1:51200))
axis ([0 5500 -60 60])
title('d')
xlabel('Sampel')
ylabel('Amplitudo')
```

Script Spektrum (Domain Frekuensi) Bantalan Normal

```
clear
clc
close

load('E:\Tugas
Akhir\Data\Bearing_Normal_Baru\Normal1000RPM\Normal1000RPMbearing15.
mat')
y1=data_all(:,1);
load('E:\Tugas
Akhir\Data\Bearing_Normal_Baru\Normal1200RPM\Normal1200RPMbearing15.
mat')
y2=data_all(:,1);
load('E:\Tugas
Akhir\Data\Bearing_Normal_Baru\Normal1400RPM\Normal1400RPMbearing15.
mat')
y3=data_all(:,1);
load('E:\Tugas
Akhir\Data\Bearing_Normal_Baru\Normal1600RPM\Normal1600RPMbearing15.
mat')
y4=data_all(:,1);
sampling_rate=51200; %kecepatan sampling Hz
recording_time=20;   %waktu perekaman data (recording time)
L=sampling_rate*recording_time;  %panjang data (length of signal)


NFFT = 2^nextpow2(L); % Next power of 2 from length of y
Y1 = fft(y1,NFFT)/L;
f = sampling_rate/2*linspace(0,1,NFFT/2+1);
NFFT = 2^nextpow2(L); % Next power of 2 from length of y
Y2 = fft(y2,NFFT)/L;
f = sampling_rate/2*linspace(0,1,NFFT/2+1);
NFFT = 2^nextpow2(L); % Next power of 2 from length of y
Y3 = fft(y3,NFFT)/L;
f = sampling_rate/2*linspace(0,1,NFFT/2+1);
NFFT = 2^nextpow2(L); % Next power of 2 from length of y
Y4 = fft(y4,NFFT)/L;
f = sampling_rate/2*linspace(0,1,NFFT/2+1);

% Plot single-sided amplitude spectrum.
figure
subplot(2,2,1)
plot(f,2*abs(Y1(1:NFFT/2+1)))
axis ([0 500 0 0.25])
title('a')
xlabel('Frequency (Hz)')
ylabel('Amplitudo')
subplot(2,2,2)
plot(f,2*abs(Y2(1:NFFT/2+1)))
axis ([0 500 0 0.25])
```

```
title('b')
xlabel('Frequency (Hz)')
ylabel('Amplitudo')
subplot(2,2,3)
plot(f,2*abs(Y3(1:NFFT/2+1)))
axis ([0 500 0 0.25])
title('c')
xlabel('Frequency (Hz)')
ylabel('Amplitudo')
subplot(2,2,4)
plot(f,2*abs(Y4(1:NFFT/2+1)))
axis ([0 500 0 0.25])
title('d')
xlabel('Frequency (Hz)')
ylabel('Amplitudo')
```

Script Spektrum (Domain Frekuensi) Bantalan Cacat Elemen Bola

```
clear
clc
close

load('E:\Tugas Akhir\Data\Cacat
Bola\BallBaru1000RPM\BallBaru1000RPMbearing15.mat')
y1=data_all(:,1);
load('E:\Tugas Akhir\Data\Cacat
Bola\BallBaru1200RPM\BallBaru1200RPMbearing15.mat')
y2=data_all(:,1);
load('E:\Tugas Akhir\Data\Cacat
Bola\BallBaru1400RPM\BallBaru1400RPMbearing15.mat')
y3=data_all(:,1);
load('E:\Tugas Akhir\Data\Cacat
Bola\BallBaru1600RPM\BallBaru1600RPMbearing15.mat')
y4=data_all(:,1);
sampling_rate=51200; %kecepatan sampling Hz
recording_time=20;   %waktu perekaman data (recording time)
L=sampling_rate*recording_time;  %panjang data (length of signal)


NFFT = 2^nextpow2(L); % Next power of 2 from length of y
Y1 = fft(y1,NFFT)/L;
f = sampling_rate/2*linspace(0,1,NFFT/2+1);
NFFT = 2^nextpow2(L); % Next power of 2 from length of y
Y2 = fft(y2,NFFT)/L;
f = sampling_rate/2*linspace(0,1,NFFT/2+1);
NFFT = 2^nextpow2(L); % Next power of 2 from length of y
Y3 = fft(y3,NFFT)/L;
f = sampling_rate/2*linspace(0,1,NFFT/2+1);
NFFT = 2^nextpow2(L); % Next power of 2 from length of y
Y4 = fft(y4,NFFT)/L;
f = sampling_rate/2*linspace(0,1,NFFT/2+1);
```

```
% Plot single-sided amplitude spectrum.
figure
subplot(2,2,1)
plot(f,2*abs(Y1(1:NFFT/2+1)))
axis ([0 500 0 0.1])
title('a')
xlabel('Frequency (Hz)')
ylabel('Amplitudo')
subplot(2,2,2)
plot(f,2*abs(Y2(1:NFFT/2+1)))
axis ([0 500 0 0.1])
title('b')
xlabel('Frequency (Hz)')
ylabel('Amplitudo')
subplot(2,2,3)
plot(f,2*abs(Y3(1:NFFT/2+1)))
axis ([0 500 0 0.1])
title('c')
xlabel('Frequency (Hz)')
ylabel('Amplitudo')
subplot(2,2,4)
plot(f,2*abs(Y4(1:NFFT/2+1)))
axis ([0 500 0 0.1])
title('d')
xlabel('Frequency (Hz)')
ylabel('Amplitudo')
```

Script Spektrum Envelope Bantalan Normal

```
%envelope normal
load('E:\Tugas
Akhir\Data\Bearing_Normal_Baru\Normal1000RPM\Normal1000RPMbearing15.
mat')
y=data_all(:,1);
analy=hilbert(data_all);
y=abs(analy);
T=recording_time;
sig_f=abs(fft(y(1:L)',L));
sig_n=sig_f/(norm(sig_f));
freq_s=(0:L-1)/T;
figure
subplot(2,2,1)
plot(freq_s,sig_n);
axis([0 500 0 0.06])
title('a')
xlabel('Frequency (Hz)')
ylabel('Amplitudo')


%envelope normal
```

```
load('E:\Tugas
Akhir\Data\Bearing_Normal_Baru\Normal1200RPM\Normal1200RPMbearing15.
mat')
y=data_all(:,1);
analy=hilbert(data_all);
y=abs(analy);
T=recording_time;
sig_f=abs(fft(y(1:L)',L));
sig_n=sig_f/(norm(sig_f));
freq_s=(0:L-1)/T;
subplot(2,2,2)
plot(freq_s,sig_n);
axis([0 500 0 0.06])
title('b')
xlabel('Frequency (Hz)')
ylabel('Amplitudo')

%envelope normal
load('E:\Tugas
Akhir\Data\Bearing_Normal_Baru\Normal1400RPM\Normal1400RPMbearing15.
mat')
y=data_all(:,1);
analy=hilbert(data_all);
y=abs(analy);
T=recording_time;
sig_f=abs(fft(y(1:L)',L));
sig_n=sig_f/(norm(sig_f));
freq_s=(0:L-1)/T;
subplot(2,2,3)
plot(freq_s,sig_n);
axis([0 500 0 0.06])
title('c')
xlabel('Frequency (Hz)')
ylabel('Amplitudo')


%envelope normal
load('E:\Tugas
Akhir\Data\Bearing_Normal_Baru\Normal1600RPM\Normal1600RPMbearing15.
mat')
y=data_all(:,1);
analy=hilbert(data_all);
y=abs(analy);
T=recording_time;
sig_f=abs(fft(y(1:L)',L));
sig_n=sig_f/(norm(sig_f));
freq_s=(0:L-1)/T;
subplot(2,2,4)
plot(freq_s,sig_n);
axis([0 500 0 0.06])
title('d')
xlabel('Frequency (Hz)')
```

```
ylabel('Amplitudo')
```

Script Spektrum Envelope Bantalan Cacat Elemen Bola

```
%envelope bola
load('E:\Tugas Akhir\Data\Cacat
Bola\BallBaru1000RPM\BallBaru1000RPMbearing15.mat')
y=data_all(:,1);
analy=hilbert(data_all);
y=abs(analy);
T=recording_time;
sig_f=abs(fft(y(1:L)',L));
sig_n=sig_f/(norm(sig_f));
freq_s=(0:L-1)/T;
figure
subplot(2,2,1)
plot(freq_s,sig_n);
axis([0 500 0 0.07])
title('a')
xlabel('Frequency (Hz)')
ylabel('Amplitudo')

%envelope bola
load('E:\Tugas Akhir\Data\Cacat
Bola\BallBaru1200RPM\BallBaru1200RPMbearing15.mat')
y=data_all(:,1);
analy=hilbert(data_all);
y=abs(analy);
T=recording_time;
sig_f=abs(fft(y(1:L)',L));
sig_n=sig_f/(norm(sig_f));
freq_s=(0:L-1)/T;
subplot(2,2,2)
plot(freq_s,sig_n);
axis([0 500 0 0.07])
title('b')
xlabel('Frequency (Hz)')
ylabel('Amplitudo')

%envelope bola
load('E:\Tugas Akhir\Data\Cacat
Bola\BallBaru1400RPM\BallBaru1400RPMbearing15.mat')
y=data_all(:,1);
analy=hilbert(data_all);
y=abs(analy);
T=recording_time;
sig_f=abs(fft(y(1:L)',L));
sig_n=sig_f/(norm(sig_f));
freq_s=(0:L-1)/T;
subplot(2,2,3)
plot(freq_s,sig_n);
axis([0 500 0 0.07])
```

```
title('c')
xlabel('Frequency (Hz)')
ylabel('Amplitudo')

%envelope bola
load('E:\Tugas Akhir\Data\Cacat
Bola\BallBaru1600RPM\BallBaru1600RPMbearing15.mat')
y=data_all(:,1);
analy=hilbert(data_all);
y=abs(analy);
T=recording_time;
sig_f=abs(fft(y(1:L)',L));
sig_n=sig_f/(norm(sig_f));
freq_s=(0:L-1)/T;
subplot(2,2,4)
plot(freq_s,sig_n);
axis([0 500 0 0.07])
title('d')
xlabel('Frequency (Hz)')
ylabel('Amplitudo')
```

Script Perbandingan Spektrum dan Envelope Bantalan Normal dengan Bantalan Cacat 1000 RPM

```
clear
clc
close

load('E:\Tugas
Akhir\Data\Bearing_Normal_Baru\Normal1000RPM\Normal1000RPMbearing15.
mat')
y1=data_all(:,1);
load('E:\Tugas Akhir\Data\Cacat
Bola\BallBaru1000RPM\BallBaru1000RPMbearing15.mat')
y2=data_all(:,1);
sampling_rate=51200; %kecepatan sampling Hz
recording_time=20;   %waktu perekaman data (recording time)
L=sampling_rate*recording_time;  %panjang data (length of signal)

NFFT = 2^nextpow2(L); % Next power of 2 from length of y
Y1 = fft(y1,NFFT)/L;
f = sampling_rate/2*linspace(0,1,NFFT/2+1);
NFFT = 2^nextpow2(L); % Next power of 2 from length of y
Y2 = fft(y2,NFFT)/L;
f = sampling_rate/2*linspace(0,1,NFFT/2+1);

% Plot single-sided amplitude spectrum.
figure
subplot(2,1,1)
plot(f,2*abs(Y1(1:NFFT/2+1)))
axis ([0 500 0 0.06])
title('a')
```

```
xlabel('Frequency (Hz)')
ylabel('Amplitudo')
subplot(2,1,2)
plot(f,2*abs(Y2(1:NFFT/2+1)))
axis ([0 500 0 0.06])
title('b')
xlabel('Frequency (Hz)')
ylabel('Amplitudo')

%envelope normal
load('E:\Tugas
Akhir\Data\Bearing_Normal_Baru\Normal1000RPM\Normal1000RPMbearing15.
mat')
y=data_all(:,1);
analy=hilbert(data_all);
y=abs(analy);
T=recording_time;
sig_f=abs(fft(y(1:L)',L));
sig_n=sig_f/(norm(sig_f));
freq_s=(0:L-1)/T;
figure
subplot(2,1,1)
plot(freq_s,sig_n);
axis([0 500 0 0.07])
title('a')
xlabel('Frequency (Hz)')
ylabel('Amplitudo')

%envelope bola
load('E:\Tugas Akhir\Data\Cacat
Bola\BallBaru1000RPM\BallBaru1000RPMbearing15.mat')
y=data_all(:,1);
analy=hilbert(data_all);
y=abs(analy);
T=recording_time;
sig_f=abs(fft(y(1:L)',L));
sig_n=sig_f/(norm(sig_f));
freq_s=(0:L-1)/T;
subplot(2,1,2)
plot(freq_s,sig_n);
axis([0 500 0 0.07])
title('b')
xlabel('Frequency (Hz)')
ylabel('Amplitudo')
```

Script Perbandingan Spektrum dan Envelope Bantalan Normal dengan Bantalan Cacat 1200 RPM

```
clear
clc
close
```

```
load('E:\Tugas
Akhir\Data\Bearing_Normal_Baru\Normal1200RPM\Normal1200RPMbearing15.
mat')
y1=data_all(:,1);
load('E:\Tugas Akhir\Data\Cacat
Bola\BallBaru1200RPM\BallBaru1200RPMbearing15.mat')
y2=data_all(:,1);
sampling_rate=51200; %kecepatan sampling Hz
recording_time=20;   %waktu perekaman data (recording time)
L=sampling_rate*recording_time;  %panjang data (length of signal)

NFFT = 2^nextpow2(L); % Next power of 2 from length of y
Y1 = fft(y1,NFFT)/L;
f = sampling_rate/2*linspace(0,1,NFFT/2+1);
NFFT = 2^nextpow2(L); % Next power of 2 from length of y
Y2 = fft(y2,NFFT)/L;
f = sampling_rate/2*linspace(0,1,NFFT/2+1);

% Plot single-sided amplitude spectrum.
figure
subplot(2,1,1)
plot(f,2*abs(Y1(1:NFFT/2+1)))
axis ([0 500 0 0.1])
title('a')
xlabel('Frequency (Hz)')
ylabel('Amplitudo')
subplot(2,1,2)
plot(f,2*abs(Y2(1:NFFT/2+1)))
axis ([0 500 0 0.1])
title('b')
xlabel('Frequency (Hz)')
ylabel('Amplitudo')

%envelope normal
load('E:\Tugas
Akhir\Data\Bearing_Normal_Baru\Normal1200RPM\Normal1200RPMbearing15.
mat')
y=data_all(:,1);
analy=hilbert(data_all);
y=abs(analy);
T=recording_time;
sig_f=abs(fft(y(1:L)',L));
sig_n=sig_f/(norm(sig_f));
freq_s=(0:L-1)/T;
figure
subplot(2,1,1)
plot(freq_s,sig_n);
axis([0 500 0 0.07])
title('a')
xlabel('Frequency (Hz)')
ylabel('Amplitudo')
```

```
%envelope bola
load('E:\Tugas Akhir\Data\Cacat
Bola\BallBaru1200RPM\BallBaru1200RPMbearing15.mat')
y=data_all(:,1);
analy=hilbert(data_all);
y=abs(analy);
T=recording_time;
sig_f=abs(fft(y(1:L)',L));
sig_n=sig_f/(norm(sig_f));
freq_s=(0:L-1)/T;
subplot(2,1,2)
plot(freq_s,sig_n);
axis([0 500 0 0.07])
title('b')
xlabel('Frequency (Hz)')
ylabel('Amplitudo')
```

Script Perbandingan Spektrum dan Envelope Bantalan Normal dengan Bantalan Cacat 1400 RPM

```
clear
clc
close

load('E:\Tugas
Akhir\Data\Bearing_Normal_Baru\Normal1400RPM\Normal1400RPMbearing15.
mat')
y1=data_all(:,1);
load('E:\Tugas Akhir\Data\Cacat
Bola\BallBaru1400RPM\BallBaru1400RPMbearing15.mat')
y2=data_all(:,1);
sampling_rate=51200; %kecepatan sampling Hz
recording_time=20;   %waktu perekaman data (recording time)
L=sampling_rate*recording_time;  %panjang data (length of signal)

NFFT = 2^nextpow2(L); % Next power of 2 from length of y
Y1 = fft(y1,NFFT)/L;
f = sampling_rate/2*linspace(0,1,NFFT/2+1);
NFFT = 2^nextpow2(L); % Next power of 2 from length of y
Y2 = fft(y2,NFFT)/L;
f = sampling_rate/2*linspace(0,1,NFFT/2+1);

% Plot single-sided amplitude spectrum.
figure
subplot(2,1,1)
plot(f,2*abs(Y1(1:NFFT/2+1)))
axis ([0 500 0 0.15])
title('a')
xlabel('Frequency (Hz)')
ylabel('Amplitudo')
subplot(2,1,2)
```

```
plot(f,2*abs(Y2(1:NFFT/2+1)))
axis ([0 500 0 0.15])
title('b')
xlabel('Frequency (Hz)')
ylabel('Amplitudo')

%envelope normal
load('E:\Tugas
Akhir\Data\Bearing_Normal_Baru\Normal1400RPM\Normal1400RPMbearing15.
mat')
y=data_all(:,1);
analy=hilbert(data_all);
y=abs(analy);
T=recording_time;
sig_f=abs(fft(y(1:L)',L));
sig_n=sig_f/(norm(sig_f));
freq_s=(0:L-1)/T;
figure
subplot(2,1,1)
plot(freq_s,sig_n);
axis([0 500 0 0.07])
title('a')
xlabel('Frequency (Hz)')
ylabel('Amplitudo')


%envelope bola
load('E:\Tugas Akhir\Data\Cacat
Bola\BallBaru1400RPM\BallBaru1400RPMbearing15.mat')
y=data_all(:,1);
analy=hilbert(data_all);
y=abs(analy);
T=recording_time;
sig_f=abs(fft(y(1:L)',L));
sig_n=sig_f/(norm(sig_f));
freq_s=(0:L-1)/T;
subplot(2,1,2)
plot(freq_s,sig_n);
axis([0 500 0 0.07])
title('b')
xlabel('Frequency (Hz)')
ylabel('Amplitudo')
```

Script Perbandingan Spektrum dan Envelope Bantalan Normal dengan Bantalan Cacat 1600 RPM

```
clear
clc
close
```

```
load('E:\Tugas
Akhir\Data\Bearing_Normal_Baru\Normal1600RPM\Normal1600RPMbearing15.
mat')
y1=data_all(:,1);
load('E:\Tugas Akhir\Data\Cacat
Bola\BallBaru1600RPM\BallBaru1600RPMbearing15.mat')
y2=data_all(:,1);
sampling_rate=51200; %kecepatan sampling Hz
recording_time=20;   %waktu perekaman data (recording time)
L=sampling_rate*recording_time;  %panjang data (length of signal)

NFFT = 2^nextpow2(L); % Next power of 2 from length of y
Y1 = fft(y1,NFFT)/L;
f = sampling_rate/2*linspace(0,1,NFFT/2+1);
NFFT = 2^nextpow2(L); % Next power of 2 from length of y
Y2 = fft(y2,NFFT)/L;
f = sampling_rate/2*linspace(0,1,NFFT/2+1);

% Plot single-sided amplitude spectrum.
figure
subplot(2,2,1)
plot(f,2*abs(Y1(1:NFFT/2+1)))
axis ([0 500 0 0.25])
title('a')
xlabel('Frequency (Hz)')
ylabel('Amplitudo')
subplot(2,2,3)
plot(f,2*abs(Y2(1:NFFT/2+1)))
axis ([0 500 0 0.25])
title('b')
xlabel('Frequency (Hz)')
ylabel('Amplitudo')

%envelope normal
load('E:\Tugas
Akhir\Data\Bearing_Normal_Baru\Normal1600RPM\Normal1600RPMbearing15.
mat')
y=data_all(:,1);
analy=hilbert(data_all);
y=abs(analy);
T=recording_time;
sig_f=abs(fft(y(1:L)',L));
sig_n=sig_f/(norm(sig_f));
freq_s=(0:L-1)/T;
figure
subplot(2,2,2)
plot(freq_s,sig_n);
axis([0 500 0 0.07])
title('a')
xlabel('Frequency (Hz)')
ylabel('Amplitudo')
```

```
%envelope bola
load('E:\Tugas Akhir\Data\Cacat
Bola\BallBaru1600RPM\BallBaru1600RPMbearing15.mat')
y=data_all(:,1);
analy=hilbert(data_all);
y=abs(analy);
T=recording_time;
sig_f=abs(fft(y(1:L)',L));
sig_n=sig_f/(norm(sig_f));
freq_s=(0:L-1)/T;
subplot(2,2,4)
plot(freq_s,sig_n);
axis([0 500 0 0.07])
title('b')
xlabel('Frequency (Hz)')
ylabel('Amplitudo')
```

Script Perbandingan Spektrum Dengan Envelope Bantalan Cacat 1000 RPM

```
clear
clc
close

load('E:\Tugas Akhir\Data\Cacat
Bola\BallBaru1000RPM\BallBaru1000RPMbearing15.mat')
y=data_all(:,1);
sampling_rate=51200; %kecepatan sampling Hz
recording_time=20;   %waktu perekaman data (recording time)
L=sampling_rate*recording_time;  %panjang data (length of signal)

NFFT = 2^nextpow2(L); % Next power of 2 from length of y
Y = fft(y,NFFT)/L;
f = sampling_rate/2*linspace(0,1,NFFT/2+1);

% Plot single-sided amplitude spectrum.
figure
subplot(2,1,1)
plot(f,2*abs(Y(1:NFFT/2+1)))
axis ([0 500 0 0.07])
title('a')
xlabel('Frequency (Hz)')
ylabel('Amplitudo')

%envelope normal
analy=hilbert(data_all);
y=abs(analy);
T=recording_time;
sig_f=abs(fft(y(1:L)',L));
sig_n=sig_f/(norm(sig_f));
```

```
freq_s=(0:L-1)/T;
subplot(2,1,2)
plot(freq_s,sig_n);
axis([0 500 0 0.07])
title('b')
xlabel('Frequency (Hz)')
ylabel('Amplitudo')
```

Script Perbandingan Spektrum Dengan Envelope Bantalan Cacat 1200 RPM

```
clear
clc
close

load('E:\Tugas Akhir\Data\Cacat
Bola\BallBaru1200RPM\BallBaru1200RPMbearing15.mat')
y=data_all(:,1);
sampling_rate=51200; %kecepatan sampling Hz
recording_time=20;   %waktu perekaman data (recording time)
L=sampling_rate*recording_time;  %panjang data (length of signal)

NFFT = 2^nextpow2(L); % Next power of 2 from length of y
Y = fft(y,NFFT)/L;
f = sampling_rate/2*linspace(0,1,NFFT/2+1);

% Plot single-sided amplitude spectrum.
figure
subplot(2,1,1)
plot(f,2*abs(Y(1:NFFT/2+1)))
axis ([0 500 0 0.07])
title('a')
xlabel('Frequency (Hz)')
ylabel('Amplitudo')

%envelope normal
analy=hilbert(data_all);
y=abs(analy);
T=recording_time;
sig_f=abs(fft(y(1:L)',L));
sig_n=sig_f/(norm(sig_f));
freq_s=(0:L-1)/T;
subplot(2,1,2)
plot(freq_s,sig_n);
axis([0 500 0 0.07])
title('b')
xlabel('Frequency (Hz)')
ylabel('Amplitudo')
```

Script Perbandingan Spektrum Dengan Envelope Bantalan Cacat 1400 RPM

```
clear
clc
close
```

```
load('E:\Tugas Akhir\Data\Cacat
Bola\BallBaru1400RPM\BallBaru1400RPMbearing15.mat')
y=data_all(:,1);
sampling_rate=51200; %kecepatan sampling Hz
recording_time=20;   %waktu perekaman data (recording time)
L=sampling_rate*recording_time;  %panjang data (length of signal)

NFFT = 2^nextpow2(L); % Next power of 2 from length of y
Y = fft(y,NFFT)/L;
f = sampling_rate/2*linspace(0,1,NFFT/2+1);

% Plot single-sided amplitude spectrum.
figure
subplot(2,1,1)
plot(f,2*abs(Y(1:NFFT/2+1)))
axis ([0 500 0 0.07])
title('a')
xlabel('Frequency (Hz)')
ylabel('Amplitudo')

%envelope normal
analy=hilbert(data_all);
y=abs(analy);
T=recording_time;
sig_f=abs(fft(y(1:L)',L));
sig_n=sig_f/(norm(sig_f));
freq_s=(0:L-1)/T;
subplot(2,1,2)
plot(freq_s,sig_n);
axis([0 500 0 0.07])
title('b')
xlabel('Frequency (Hz)')
ylabel('Amplitudo')
```

Script Perbandingan Spektrum Dengan Envelope Bantalan Cacat 1600 RPM

```
clear
clc
close

load('E:\Tugas Akhir\Data\Cacat
Bola\BallBaru1600RPM\BallBaru1600RPMbearing15.mat')
y=data_all(:,1);
sampling_rate=51200; %kecepatan sampling Hz
recording_time=20;   %waktu perekaman data (recording time)
L=sampling_rate*recording_time;  %panjang data (length of signal)

NFFT = 2^nextpow2(L); % Next power of 2 from length of y
Y = fft(y,NFFT)/L;
f = sampling_rate/2*linspace(0,1,NFFT/2+1);
```

```
% Plot single-sided amplitude spectrum.
figure
subplot(2,1,1)
plot(f,2*abs(Y(1:NFFT/2+1)))
axis ([0 500 0 0.1])
title('a')
xlabel('Frequency (Hz)')
ylabel('Amplitudo')

%envelope normal
analy=hilbert(data_all);
y=abs(analy);
T=recording_time;
sig_f=abs(fft(y(1:L)',L));
sig_n=sig_f/(norm(sig_f));
freq_s=(0:L-1)/T;
subplot(2,1,2)
plot(freq_s,sig_n);
axis([0 500 0 0.1])
title('b')
xlabel('Frequency (Hz)')
ylabel('Amplitudo')
```

Script Perbandingan Envelope Bantalan Cacat Pada Semua Kecepatan

```
%envelope bola
load('E:\Tugas Akhir\Data\Cacat
Bola\BallBaru1000RPM\BallBaru1000RPMbearing15.mat')
y=data_all(:,1);
analy=hilbert(data_all);
y=abs(analy);
T=recording_time;
sig_f=abs(fft(y(1:L)',L));
sig_n=sig_f/(norm(sig_f));
freq_s=(0:L-1)/T;
figure
subplot(2,1,1)
plot(freq_s,sig_n);
axis([0 500 0 0.07])
title('a')
xlabel('Frequency (Hz)')
ylabel('Amplitudo')


%envelope bola
load('E:\Tugas Akhir\Data\Cacat
Bola\BallBaru1200RPM\BallBaru1200RPMbearing15.mat')
y=data_all(:,1);
analy=hilbert(data_all);
y=abs(analy);
T=recording_time;
sig_f=abs(fft(y(1:L)',L));
sig_n=sig_f/(norm(sig_f));
```

```
freq_s=(0:L-1)/T;
subplot(2,1,2)
plot(freq_s,sig_n);
axis([0 500 0 0.07])
title('b')
xlabel('Frequency (Hz)')
ylabel('Amplitudo')

%envelope bola
load('E:\Tugas Akhir\Data\Cacat
Bola\BallBaru1400RPM\BallBaru1400RPMbearing15.mat')
y=data_all(:,1);
analy=hilbert(data_all);
y=abs(analy);
T=recording_time;
sig_f=abs(fft(y(1:L)',L));
sig_n=sig_f/(norm(sig_f));
freq_s=(0:L-1)/T;
figure
subplot(2,1,1)
plot(freq_s,sig_n);
axis([0 500 0 0.07])
title('c')
xlabel('Frequency (Hz)')
ylabel('Amplitudo')


%envelope bola
load('E:\Tugas Akhir\Data\Cacat
Bola\BallBaru1600RPM\BallBaru1600RPMbearing15.mat')
y=data_all(:,1);
analy=hilbert(data_all);
y=abs(analy);
T=recording_time;
sig_f=abs(fft(y(1:L)',L));
sig_n=sig_f/(norm(sig_f));
freq_s=(0:L-1)/T;
subplot(2,1,2)
plot(freq_s,sig_n);
axis([0 500 0 0.07])
title('d')
xlabel('Frequency (Hz)')
ylabel('Amplitudo')
```