LAMPIRAN

Lampiran 1: *Script* Matlab Pengambilan Data Akusisi.

```
%Script to run data acquisition using National Instrument NI 9234
%Created: July 2018, Ikhsan Aprima Kausar

clear all;
clc;
close all;

tic;

s = daq.createSession('ni');
s.DurationInSeconds = 10;
Dur = s.DurationInSeconds;
s.Rate = 17066;
s.addAnalogInputChannel('cDAQ1Mod1', 'ai0', 'Accelerometer');
%s.addAnalogInputChannel('cDAQ1Mod1', 'ai1', 'Accelerometer');
%s.addAnalogInputChannel('cDAQ1Mod1', 'ai2', 'Accelerometer');
%s.addAnalogInputChannel('cDAQ1Mod1', 'ai3', 'Voltage'); %
Tachometer
%s.addAnalogInputChannel('cDAQ1Mod2', 'ai0', 'Microphone');
%s.addAnalogInputChannel('cDAQ1Mod2', 'ai1', 'Microphone');

s.Channels(1).Sensitivity = 100.10E-3; %mV/g Type 4507B
serial:11165
%s.Channels(2).Sensitivity = 95.83E-3; %mV/g Type 4507B
serial:11026
%s.Channels(3).Sensitivity = 99.56E-3; %mV/g Type 4507B
serial:10984
%s.Channels(4).Sensitivity = 94.50E-3;
%s.Channels(5).Sensitivity = 9.40E-3;  %mV/Pa Model 130B40
serial:41741
%s.Channels(6).Sensitivity = 8.60E-3;  %mV/Pa Model 130B40
serial:41842



for i=1:50

data = s.startForeground();           % start recording vibration
data
data_ch1 = data(:,1);
%data_ch2 = data(:,2);
%data_ch3 = data(:,3);
%data_ch4 = data(:,4);
%data_ch5 = data(:,5);
%data_ch6 = data(:,6);

rootname = 'E:\Tugas_Akhir';      % drive tujuan dan nama file
extension = '.mat';               % ekstension utk nama file
namafile = [rootname,'Normal_',num2str(i),extension];
data_all = [data_ch1];
eval(['save ', namafile ,' data_all']);
pause(2)
```

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

Lampiran 2: *Script* Matlab Pengolahan Data Mentah Menjadi Spektrum dan Spektrum Envelope Dengan Bentang Frekuensi Rendah

```
clear
clc
close all

load('E:\pompa_normal.mat'); %memanggil data sinyal getaran pompa
normal dengan bentang frekuensi rendah
y=my_VAR_1(:,3);

sampling_rate=17066; %kecepatan sampling Hz
recording_time=10;   %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);
x = 2*abs(Y(1:NFFT/2+1));

% Plot single-sided amplitude spectrum.
figure
plot(f,x);
axis ([0 1000 0 0.1]);
title('Spektrum Pompa Normal Frekuensi Rendah')
xlabel('Frequency (Hz)')
ylabel('Amplitude (A)')

analytic=hilbert(y);
y=abs(analytic);
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 spectrum envelope
figure
plot(f,2*abs(Y(1:NFFT/2+1)))
axis ([0 300 0 0.1]);
title('Spektrum Envelope Pompa Normal Frekeunsi Rendah')
xlabel('Frequency (Hz)')
ylabel('Amplitude (A)')



clear
clc
close all
```

```
load('E:\pompa_kavitasi1.mat'); %memanggil data sinyal getaran
pompa kavitasi 1 dengan bentang frekuensi rendah

y=my_VAR_2(:,3);

sampling_rate=17066; %kecepatan sampling Hz
recording_time=10;   %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
plot(f,2*abs(Y(1:NFFT/2+1)))
axis ([0 1000 0 0.1]);
title('Spektrum Pompa Kavitasi Rendah Frekuensi Rendah')
xlabel('Frequency (Hz)')
ylabel('Amplitude (A)')

analytic=hilbert(y);
y=abs(analytic);
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 spectrum envelope
figure
plot(f,2*abs(Y(1:NFFT/2+1)))
axis ([0 300 0 0.1]);
title('Spektrum Envelope Pompa Kavitasi Rendah Frekuensi Rendah')
xlabel('Frequency (Hz)')
ylabel('Amplitude (A)')



clear
clc
close all

load('E:\pompa_kavitasi2.mat');  %memanggil data sinyal getaran
pompa kavitasi 2 dengan bentang frekuensi rendah
y=my_VAR_3(:,3);

sampling_rate=17066; %kecepatan sampling Hz
recording_time=10;   %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
plot(f,2*abs(Y(1:NFFT/2+1)))
axis ([0 1000 0 0.1]);
title('Spektrum Pompa Kavitasi Sedang Frekuensi Rendah')
xlabel('Frequency (Hz)')
ylabel('Amplitude (A)')

analytic=hilbert(y);
y=abs(analytic);
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 spectrum envelope
figure
plot(f,2*abs(Y(1:NFFT/2+1)))
axis ([0 300 0 0.1]);
title('Spektrum Envelope Pompa Kavitasi Sedang Frekuensi Rendah')
xlabel('Frequency (Hz)')
ylabel('Amplitude (A)')



clear
clc
close all

load('E:\pompa_kavitasi3.mat'); %memanggil data sinyal getaran
pompa kavitasi 3 dengan bentang frekuensi rendah
y=my_VAR_4(:,3);

sampling_rate=17066; %kecepatan sampling Hz
recording_time=10;   %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
plot(f,2*abs(Y(1:NFFT/2+1)))
axis ([0 1000 0 0.1]);
title('Spektrum Pompa Kavitasi Lanjut Frekuensi Rendah')
xlabel('Frequency (Hz)')
ylabel('Amplitude (A)')

analytic=hilbert(y);
y=abs(analytic);
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 spectrum envelope
figure
plot(f,2*abs(Y(1:NFFT/2+1)))
axis ([0 300 0 0.1]);
title('Spektrum Envelope Pompa Kavitasi Lanjut Frekuensi Rendah')
xlabel('Frequency (Hz)')
ylabel('Amplitude (A)')
```

Lampiran 3: *Script* Matlab Pengolahan Data Mentah Menjadi Spektrum dan Spektrum Envelope Dengan Bentang Frekuensi Tinggi

```
clear
clc
close all

load('E:\pompa_normal_ft.mat'); %memanggil data sinyal getaran
pompa normal dengan bentang frekuensi tinggi
y=my_VAR_1(:,4);

sampling_rate=17066; %kecepatan sampling Hz
recording_time=10;   %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
plot(f,2*abs(Y(1:NFFT/2+1)))
axis ([0 8500 0 0.05]);
title('Spektrum Pompa Normal Frekuensi Tinggi')
xlabel('Frequency (Hz)')
ylabel('Amplitude (A)')

analytic=hilbert(y);
y=abs(analytic);
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 spectrum envelope
figure
plot(f,2*abs(Y(1:NFFT/2+1)))
axis ([0 8500 0 0.5]);
title('Spektrum Envelope Pompa Normal Frekuensi Tinggi')
xlabel('Frequency (Hz)')
ylabel('Amplitude (A)')
```

```
clear
clc
close all

load('E:\pompa_kavitasi1_ft.mat'); %memanggil data sinyal getaran
pompa kavitasi 1 dengan bentang frekuensi tinggi
y=my_VAR_2(:,4);

sampling_rate=17066; %kecepatan sampling Hz
recording_time=10;   %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
plot(f,2*abs(Y(1:NFFT/2+1)))
axis ([0 8500 0 0.05]);
title('Spektrum Pompa Kavitasi Rendah Frekuensi Tinggi')
xlabel('Frequency (Hz)')
ylabel('Amplitude (A)')

analytic=hilbert(y);
y=abs(analytic);
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 spectrum envelope
figure
plot(f,2*abs(Y(1:NFFT/2+1)))
axis ([0 8500 0 0.5]);
title('Spektrum Envelope Pompa Kavitasi Rendah Frekuensi Tinggi')
xlabel('Frequency (Hz)')
ylabel('Amplitude (A)')
```

```
clear
clc
close all

load('E:\k2.mat'); %memanggil data sinyal getaran pompa kavitasi 2
dengan bentang frekuensi tinggi
y=my_VAR_1(:,4);

sampling_rate=17066; %kecepatan sampling Hz
recording_time=10;   %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
plot(f,2*abs(Y(1:NFFT/2+1)))
axis ([0 8500 0 0.05]);
title('Spektrum Pompa Kavitasi Sedang Frekuensi Tinggi')
xlabel('Frequency (Hz)')
ylabel('Amplitude (A)')

analytic=hilbert(y);
y=abs(analytic);
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 spectrum envelope
figure
plot(f,2*abs(Y(1:NFFT/2+1)))
axis ([0 8500 0 0.5]);
title('Spektrum Envelope Pompa Kavitasi Sedang Frekuensi Tinggi')
xlabel('Frequency (Hz)')
ylabel('Amplitude (A)')



clear
clc
close all

load('E:\pompa_kavitasi3_ft.mat'); %memanggil data sinyal getaran
pompa kavitasi 3 dengan bentang frekuensi tinggi
y=my_VAR_4(:,4);

sampling_rate=17066; %kecepatan sampling Hz
recording_time=10;   %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
plot(f,2*abs(Y(1:NFFT/2+1)))
axis ([0 8500 0 0.05]);
title('Spektrum Pompa Kavitasi Lanjut Frekuensi Tinggi')
xlabel('Frequency (Hz)')
ylabel('Amplitude (A)')

analytic=hilbert(y);
y=abs(analytic);
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 spectrum envelope
figure
plot(f,2*abs(Y(1:NFFT/2+1)))
axis ([0 8500 0 0.5]);
title('Spektrum Envelope Pompa Kavitasi Lanjut Frekuensi Tinggi')
xlabel('Frequency (Hz)')
ylabel('Amplitude (A)')
```