

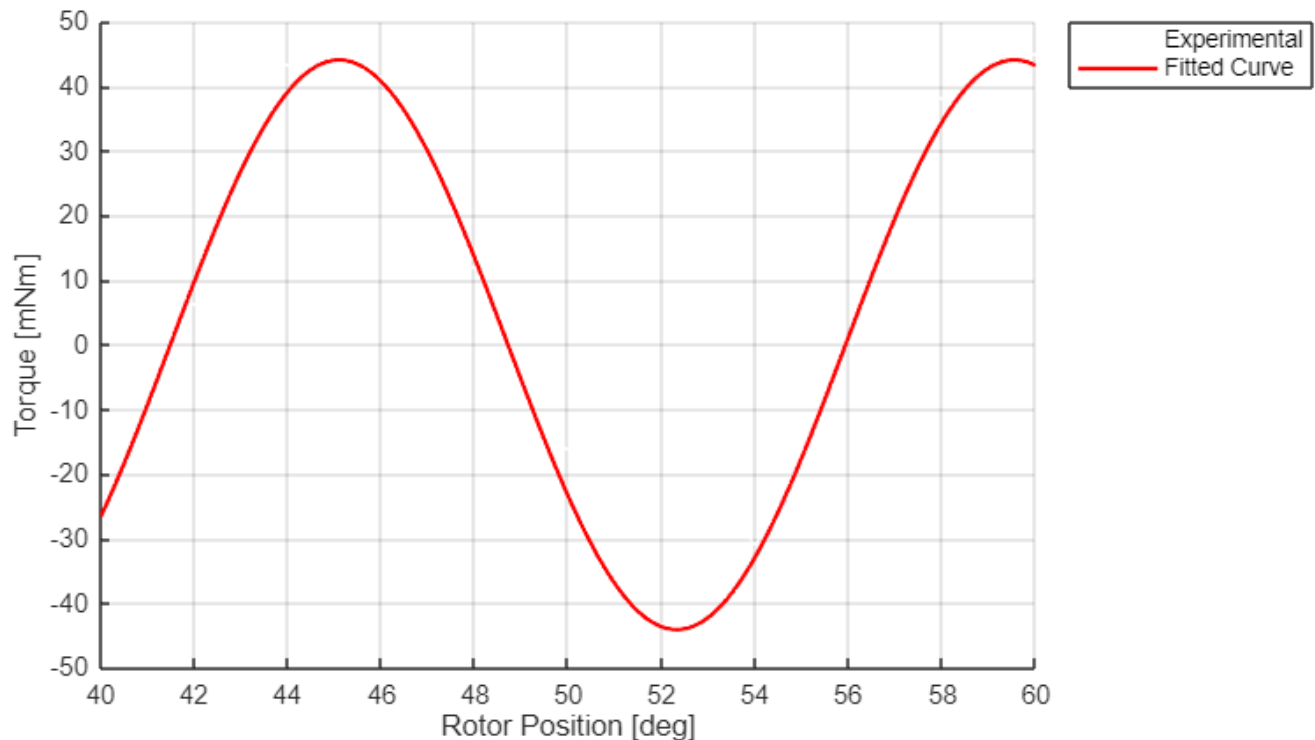
```
clc; clear;

load("lab_3_data.mat");
```

Static Torque vs. Rotor Position, Phase A energized, at V = 10 V

```
rotor_position = rotor_position';
phase_a_10_tor = phase_a_10_tor';

fig1 = figure();
hold on
grid on
plot(rotor_position, phase_a_10_tor, "xw");
[fitobject, gof] = fit(rotor_position, phase_a_10_tor, "sin1");
plot(fitobject, 'r');
xlabel("Rotor Position [deg]");
ylabel("Torque [mNm]");
fig1.Position(3:4)=[750,400];
legend(["Experimental", "Fitted Curve"], "Location", "northeastoutside");
```



```
% title("Static Torque vs. Rotor Position, Phase A Energized, at V = 10V");
coeffs = coeffvalues(fitobject)
```

```
coeffs = 1x3
    44.0644    0.4350   -5.4824
```

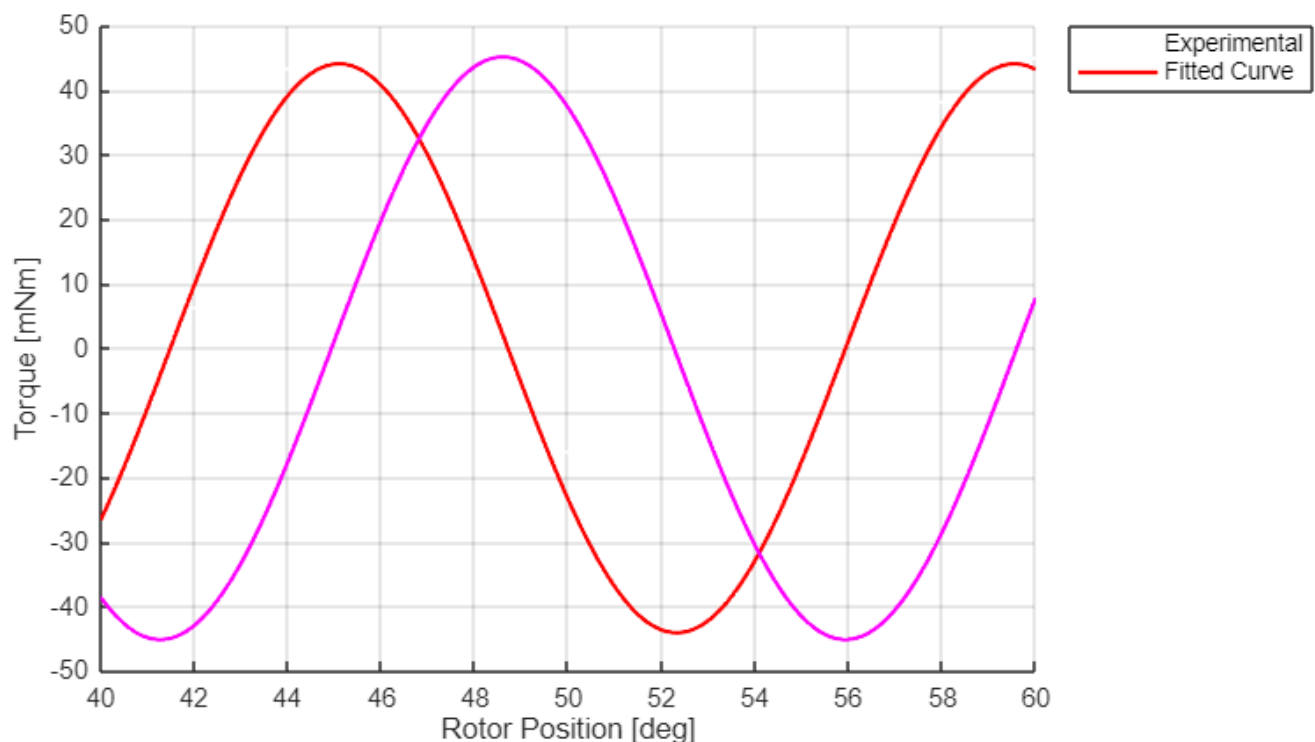
```
disp("A sin(Bx + C)");
```

$$A \sin(Bx + C)$$

Static Torque vs. Rotor Position, Phase B energized, at V = 10 V

```
phase_b_10_tor = phase_b_10_tor';

hold on
grid on
% plot(rotor_position, phase_b_10_tor, "xm");
[fitobject2, gof] = fit(rotor_position, phase_b_10_tor, "sin1");
plot(fitobject2, 'm');
xlabel("Rotor Position [deg]");
ylabel("Torque [mNm]");
fig1.Position(3:4)=[750,400];
% title("Static Torque vs. Rotor Position, Phase B Energized, at V = 10V");
legend(["Experimental", "Fitted Curve"], "Location", "northeastoutside");
```



```
coeffs = coeffvalues(fitobject2)
```

```
coeffs = 1x3
    45.1265    0.4287   -6.6989
```

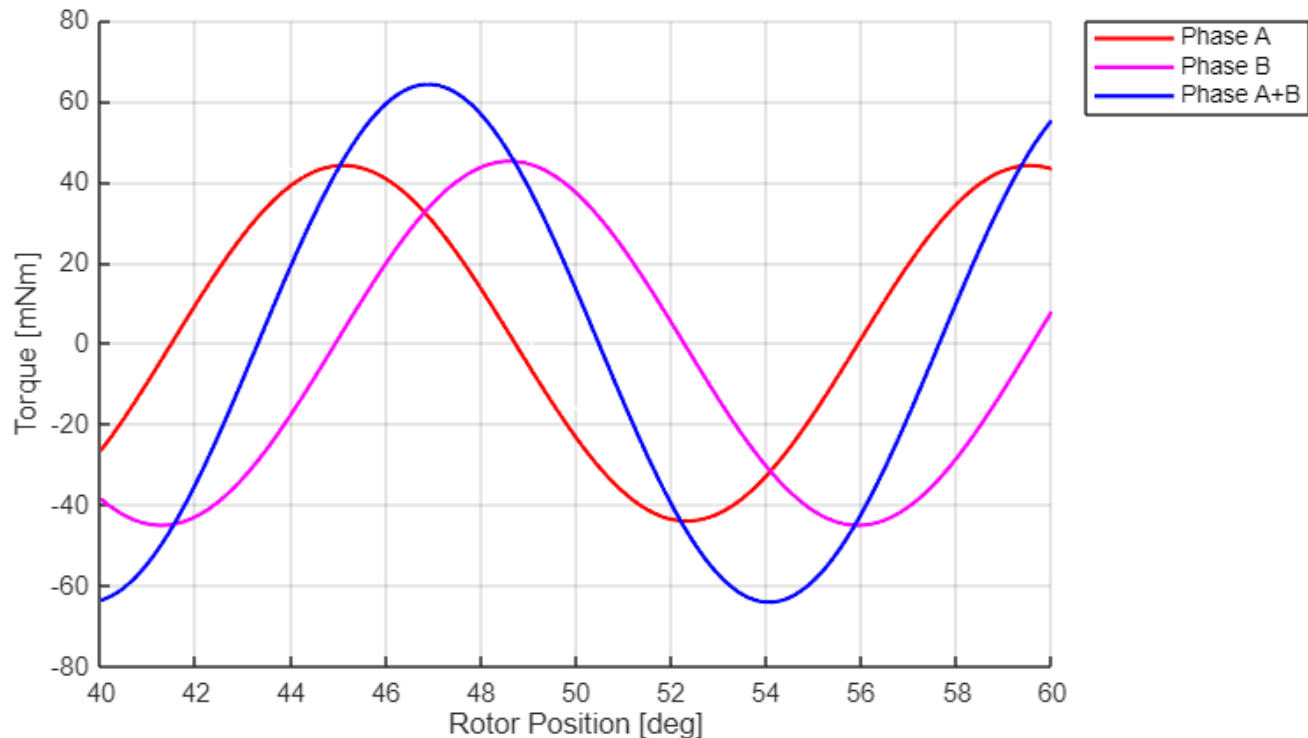
Static Torque vs. Rotor Position, Phase A and B energized, at V = 10 V

```
phase_a_and_b_10_tor = phase_a_and_b_10_tor';
```

```

hold on
grid on
% plot(rotor_position, phase_a_and_b_10_tor, "xb");
[fitobject3, gof] = fit(rotor_position, phase_a_and_b_10_tor, "sin1");
plot(fitobject3, 'b');
xlabel("Rotor Position [deg]");
ylabel("Torque [mNm]");
fig1.Position(3:4)=[750,400];
legend(["", "Phase A", "Phase B", "Phase A+B"], "Location", "northeastoutside");

```



```

coeffs = coeffvalues(fitobject3)

```

```

coeffs = 1x3
    64.1768    0.4384   -6.4193

```

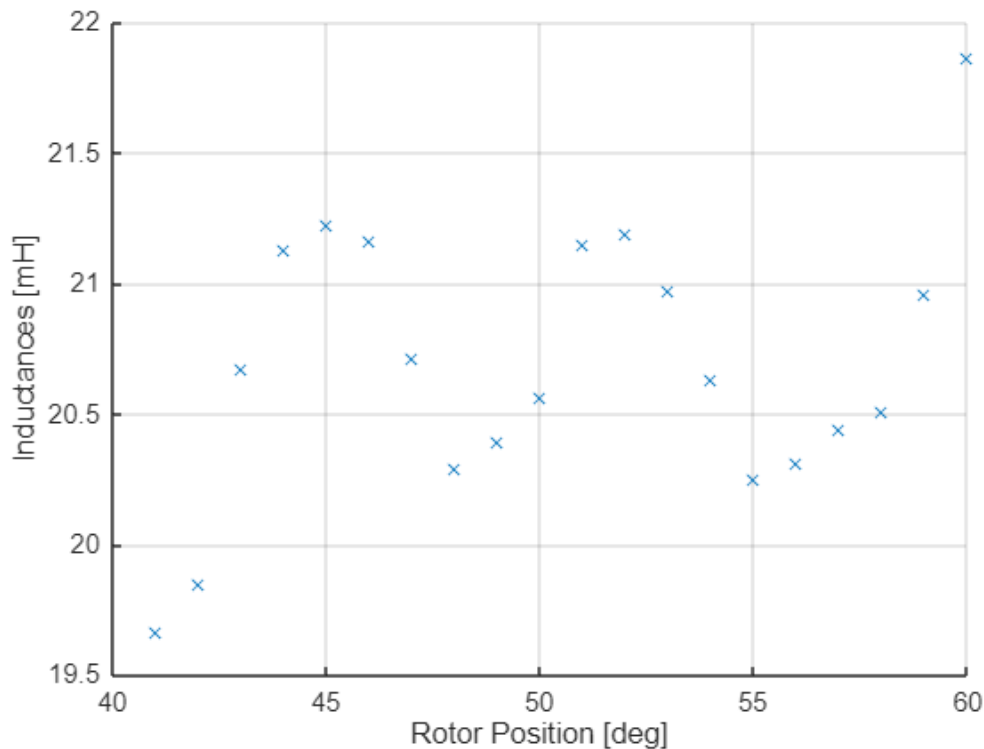
Inductance of Motor Winding vs. Angular Position

```

inductances = inductances';

fig2 = figure();
hold on
grid on
plot(rotor_position, inductances, "x", "Color", "#0072BD");
xlabel("Rotor Position [deg]");
ylabel("Inductances [mH]");
fig2.Position(3:4)=[550,400];

```



```
std(inductances)
```

```
ans =  
0.5205
```

```
max_ind = max(inductances);  
mean_ind = mean(inductances);  
error = (max_ind - mean_ind)/mean_ind * 100
```

```
error =  
5.6268
```

Checking of the measured Phase A and B is the same as the Phases A+B

```
calc_A_B_torque = phase_a_10_tor + phase_b_10_tor;  
  
fig3 = figure();  
  
hold on  
grid on  
  
plot(rotor_position, calc_A_B_torque, "xr", rotor_position, phase_a_and_b_10_tor,  
"ob");  
xlabel("Rotor Position [deg]");  
ylabel("Torque [mNm]");  
legend(["Combined Phase A and B", "Experimental Phase A+B"], "Location",  
"northeastoutside");  
fig3.Position(3:4) = [750, 400];
```

