```
clearvars
format shortEng

freq = 50;
T = 1/freq;

percents = [0 20 40 60 80 100] % corresponding to the measurements
```

```
percents = 1×6
     0.0000e+000    20.0000e+000    40.0000e+000    60.0000e+000    80.0000e+000 ⋯
```

```
% experimental RPM measurement with HTI HT522 Tachometer
rpms = [0 5000, 7300, 8420, 9220, 10200]
```

```
rpms = 1×6
     0.0000e+000     5.0000e+003     7.3000e+003     8.4200e+003     9.2200e+003 ⋯
```

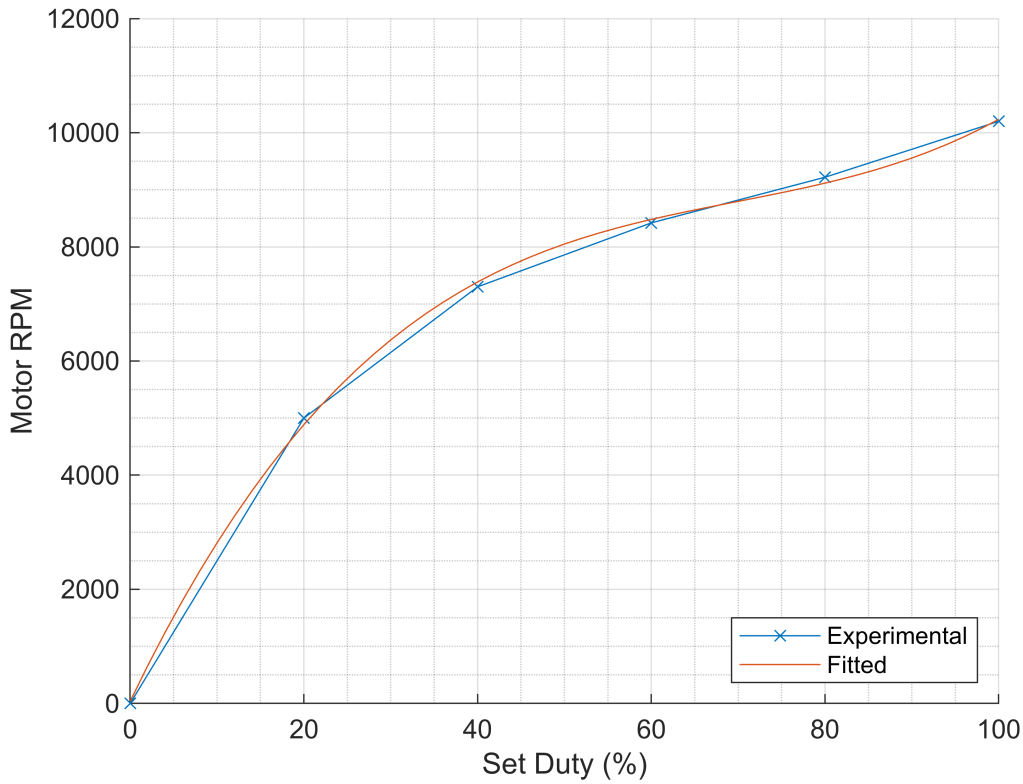
```
fittedPoly = polyfit(percents, rpms, 3)
```

```
fittedPoly = 1×4
    19.6528e-003    -4.1131e+000   316.7579e+000    37.6190e+000
```

```


theoPercents = 0:2:100;
theoRpms = polyval(fittedPoly, theoPercents);

figure()
hold on
grid on
grid minor
plot(percents, rpms, "x-")
plot(theoPercents, theoRpms)
xlabel("Set Duty (%)")
ylabel("Motor RPM")
legend("Experimental", "Fitted", Location="southeast")
hold off
saveas(gcf, "graph_duty.png")
```




```
%% Expected RPM at maximum using KV
motorKV = 1100;
appliedvoltage = 9;
expectedMaxRPM = motorKV*appliedvoltage
```

```
expectedMaxRPM =
     9.9000e+003
```

```
thousands = percents*10 % corresponding to the measurements
```

```
thousands = 1×6
     0.0000e+000    200.0000e+000    400.0000e+000    600.0000e+000    800.0000e+000 ···
```

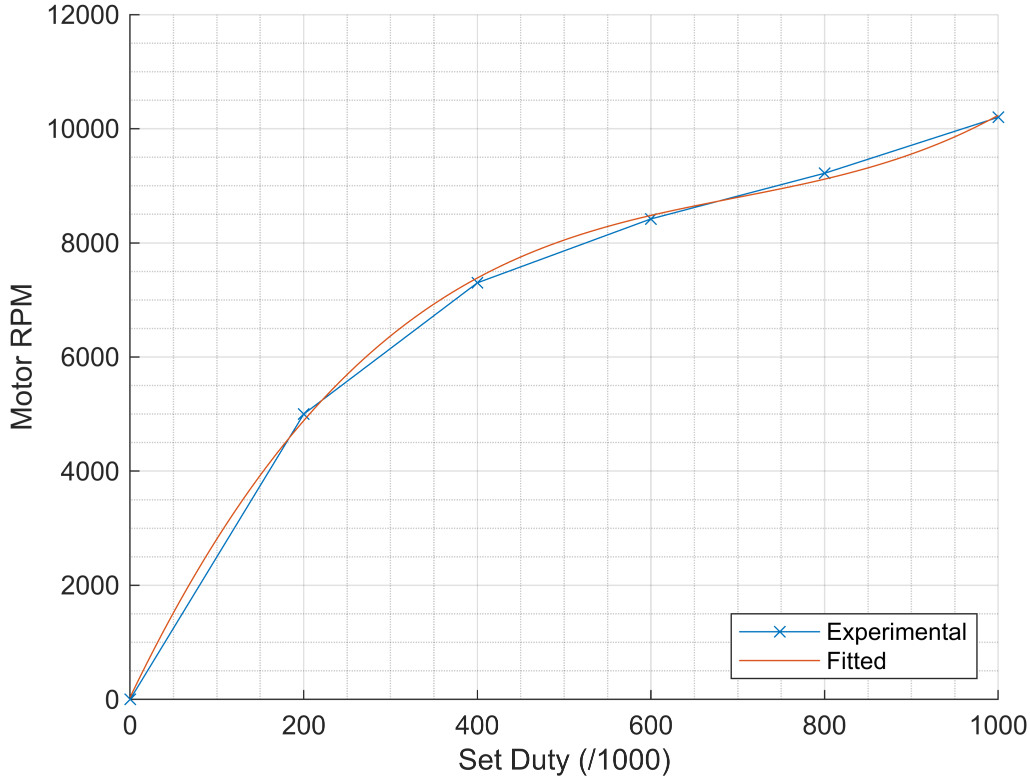
```
% experimental RPM measurement with HTI HT522 Tachometer
% rpms = [4600, 7300, 8420, 9220, 10200]
fittedPoly = polyfit(thousands, rpms, 3)
```

```
fittedPoly = 1×4
    19.6528e-006    -41.1310e-003     31.6758e+000     37.6190e+000
```

```
theoThosands = 0:2:1000;
theoRpms = polyval(fittedPoly, theoThosands);

figure()
hold on
```

```
grid on
grid minor
plot(thousands, rpms, "x-")
plot(theoThosands, theoRpms)
xlabel("Set Duty (/1000)")
ylabel("Motor RPM")
legend("Experimental", "Fitted", Location="southeast")
hold off
saveas(gcf, "graph_duty_thosand.png")
```




```
%% Expected RPM at maximum using KV
motorKV = 1100;
appliedvoltage = 9;
expectedMaxRPM = motorKV*appliedvoltage
```

```
expectedMaxRPM =
    9.9000e+003
```

```
syms x y
y = poly2sym(fittedPoly)
```

y =

$$\frac{5800476192066451\,x^3}{295147905179352825856} - \frac{691\,x^2}{16800} + \frac{79823\,x}{2520} + \frac{5294410276223843}{140737488355328}$$

```
finv = matlabFunction(finverse(y))
```

```
finv = function_handle with value:
    @(x)1.0./(x.*2.544169611307419e+4+sqrt((x.*2.544169611307419e+4-2.236410629423207e+8).^2+1.293484973688578e+14)
```

```
finv(9000)
```

```
ans =
   765.8511e+000
```

```
getDuty = finv
```

```
getDuty = function_handle with value:
    @(x)1.0./(x.*2.544169611307419e+4+sqrt((x.*2.544169611307419e+4-2.236410629423207e+8).^2+1.293484973688578e+14)
```

```
% fittedPolyInverse = polyfit(rpms, thousands, 3)
% theoRpms = 0:50:10e3
% theoThosands = polyval(fittedPolyInverse, theoRpms)
% figure()
% hold on
% grid on
% grid minor
% plot(thousands, rpms, "x-")
% plot(theoThosands, theoRpms)
% xlabel("Set Duty (/1000)")
% ylabel("Motor RPM")
% legend("Experimental", "Fitted", Location="southeast")
% hold off
% saveas(gcf, "graph_duty_thosand_inverse.png")
```