
Table of Contents

.....	1
Experimental Data	1
Constants	1
Transfer Function	1

```
clear;clc;close all;
```

```
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```

```
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```

Experimental Data

```
path = "Rigid Arm Data/";  
files = dir(path+"*.txt");  
filename = files(randi([1,length(files)])).name;  
data = load(path+filename);  
time = (data(:,1)-data(1,1))./1000;  
theta = data(:,2);
```

Constants

```
Kg = 33.3; % gear ratio  
Km = 0.0401; % motor constant  
Rm = 19.2; % armature resistance [ohm]  
J = 0.0005+0.0015; % total inertia [kg*m^2]
```

```
fpara = strsplit(filename,"_");  
Kpt = str2double(fpara{1});  
Kdt = str2double(fpara{2});
```

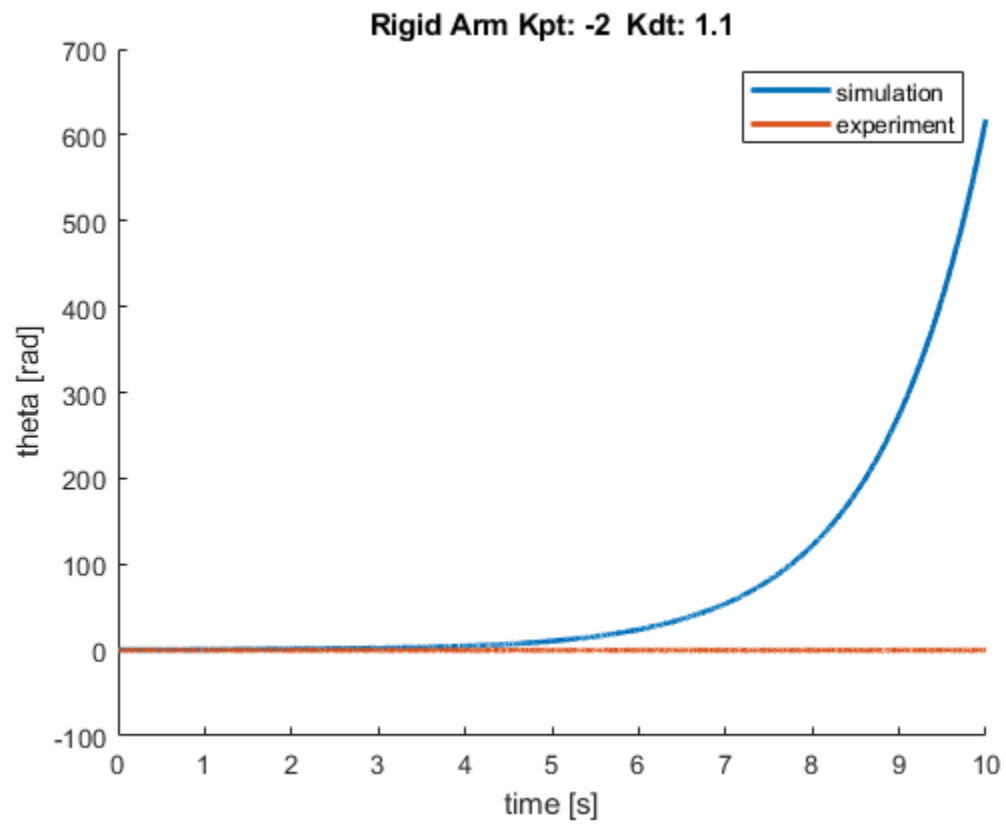
Transfer Function

```
num = Kpt*Kg*Km/(J*Rm);  
den = [1,Kg^2*Km^2/(J*Rm)+Kdt*Kg*Km/(J*Rm),Kpt*Kg*Km/(J*Rm)];  
sysTF = tf(num,den);
```

```
s = stepinfo(sysTF,'SettlingTimeThreshold',.05);
```

```
T = time;  
U = data(:,6);  
[thetaSim,timeSim,~] = lsim(sysTF,U,T);  
hold on;  
plot(timeSim,thetaSim,"LineWidth",2);  
plot(time,theta,"LineWidth",2);  
title("Rigid Arm Kpt: "+Kpt+" Kdt: "+Kdt);  
legend("simulation","experiment");  
ylabel("theta [rad]");
```

```
xlabel("time [s]");
```



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