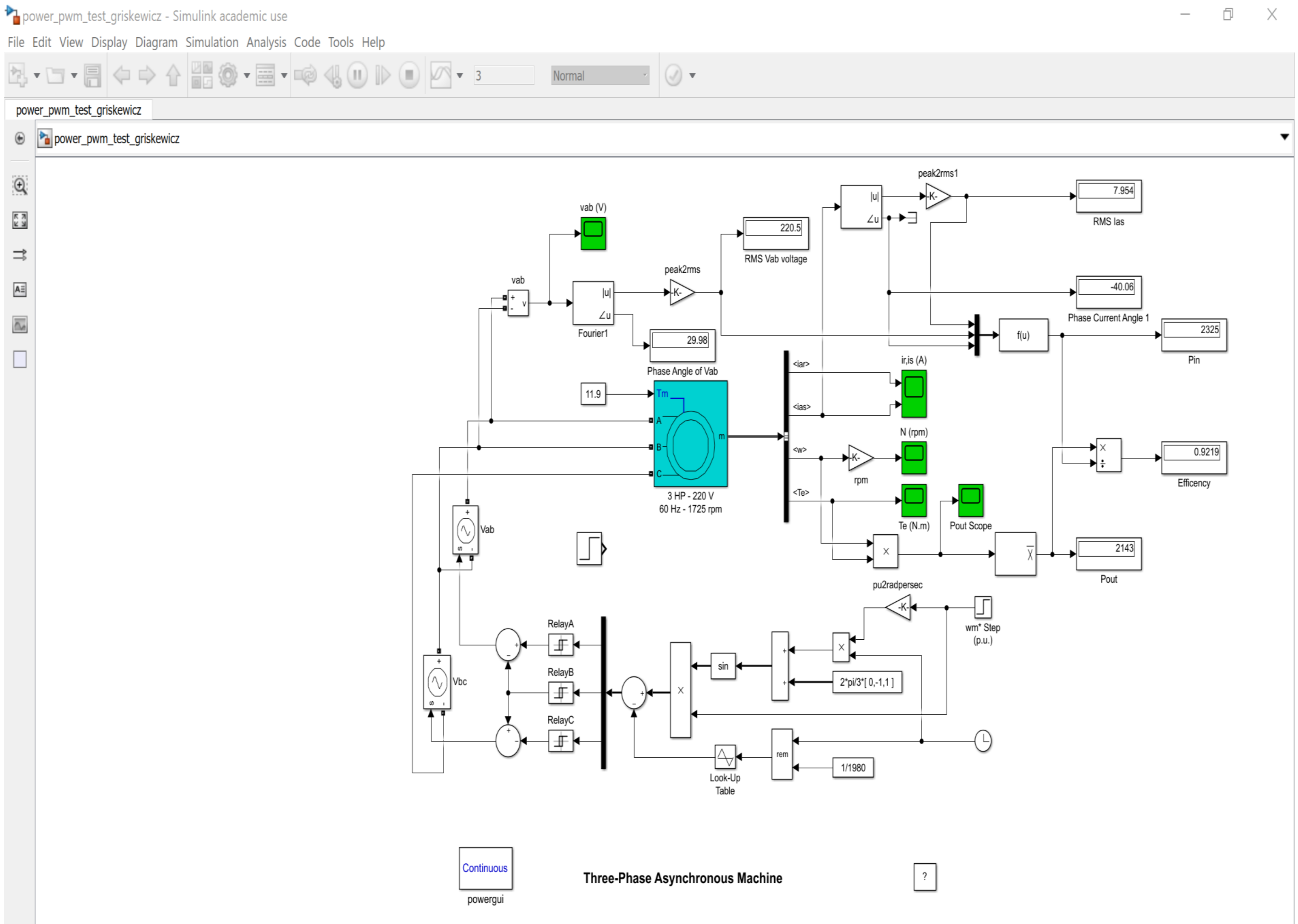
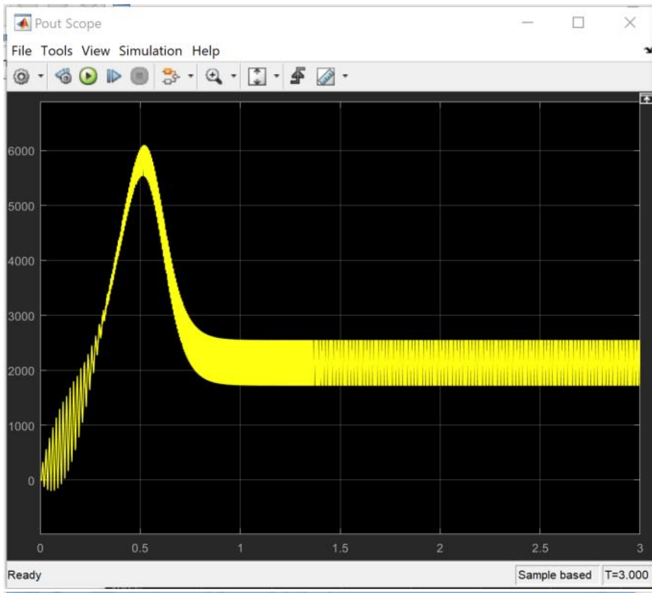
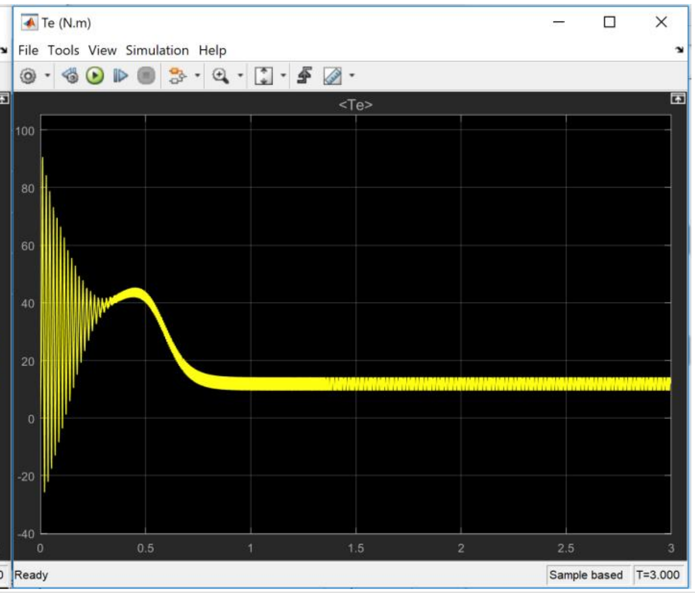


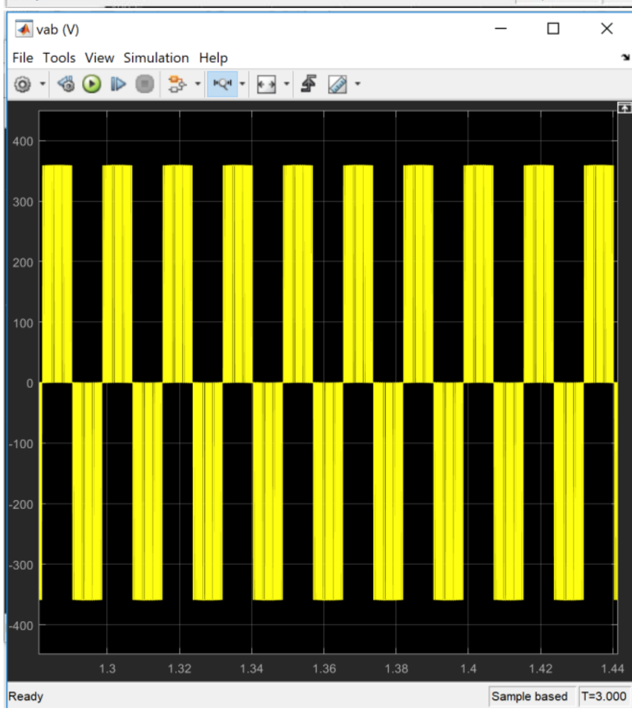
power_pwm_test_griskewicz - Simulink academic use
File Edit View Display Diagram Simulation Analysis Code Tools Help
3
Normal
power_pwm_test_griskewicz
power_pwm_test_griskewicz
vab (V)
vab
Fourier1
peak2rms
29.98
Phase Angle of Vab
220.5
RMS Vab voltage
peak2rms1
7.954
RMS Ias
-40.06
Phase Current Angle 1
f(u)
2325
Pin
11.9
Tm
A
B
C
m
3 HP - 220 V
60 Hz - 1725 rpm
<iar>
<ias>
<w>
<Te>
ir,is (A)
N (rpm)
rpm
Te (N.m)
Pout Scope
0.9219
Efficency
2143
Pout
Vab
Vbc
pu2radpersec
wm* Step
(p.u.)
RelayA
RelayB
RelayC
sin
2*pi/3*[0,-1,1]
rem
1/1980
Look-Up
Table
Continuous
powergui
Three-Phase Asynchronous Machine
?



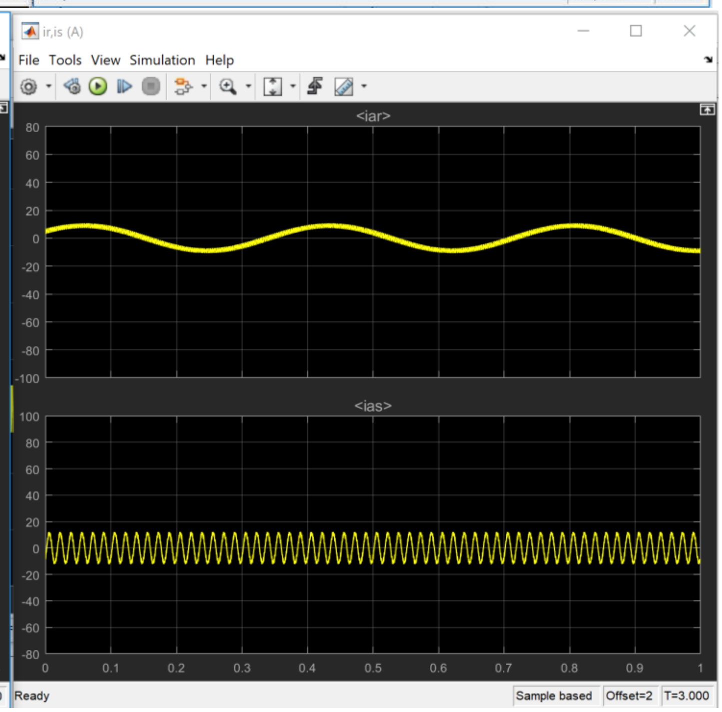
Pout Scope
File Tools View Simulation Help
6000
5000
4000
3000
2000
1000
0
0
0.5
1
1.5
2
2.5
3
Ready
Sample based
T=3.000



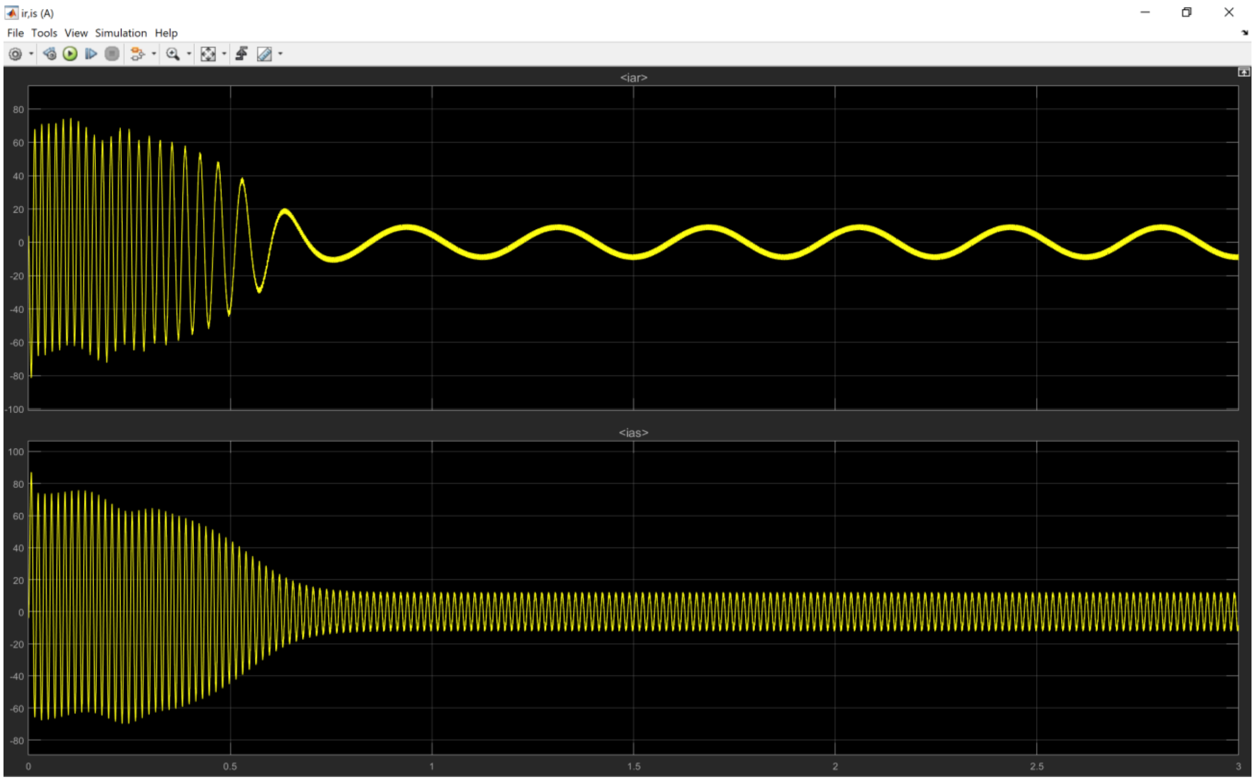
Te (N.m)
File Tools View Simulation Help
<Te>
100
80
60
40
20
0
-20
-40
0
0.5
1
1.5
2
2.5
3
Ready
Sample based
T=3.000

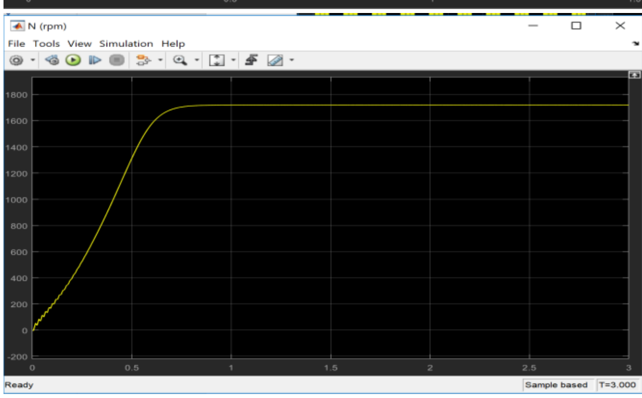


vab (V)
File Tools View Simulation Help
400
300
200
100
0
-100
-200
-300
-400
1.3
1.32
1.34
1.36
1.38
1.4
1.42
1.44
Ready
Sample based
T=3.000



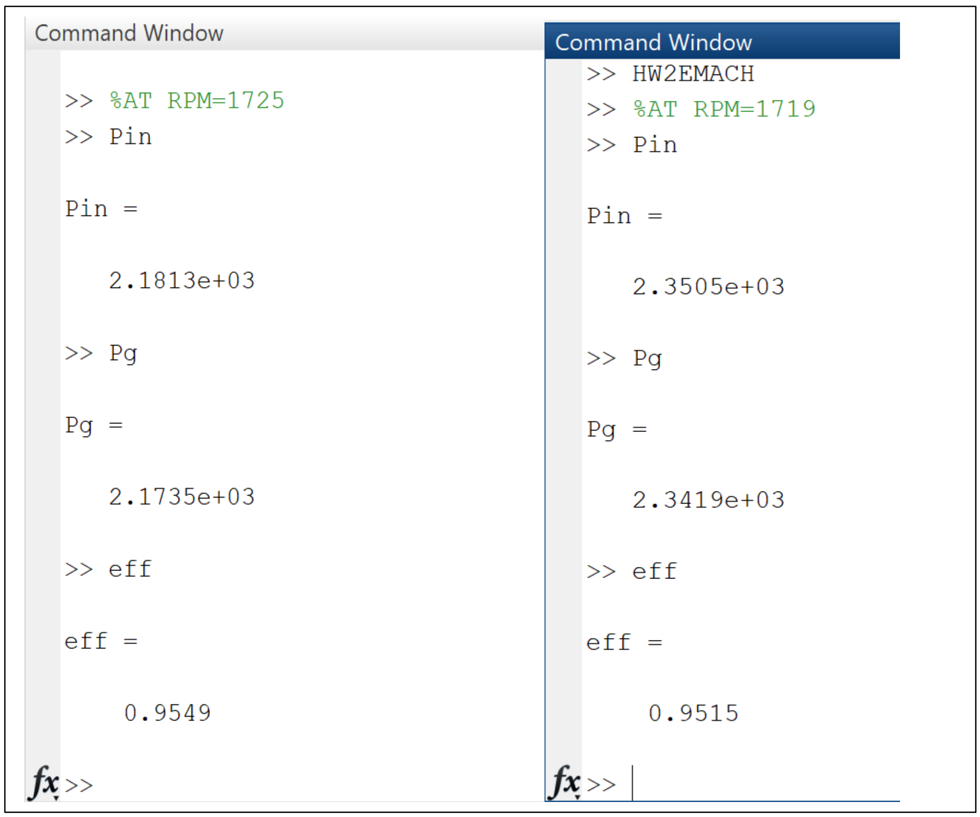
ir,is (A)
File Tools View Simulation Help
<iar>
80
60
40
20
0
-20
-40
-60
-80
-100
<ias>
100
80
60
40
20
0
-20
-40
-60
-80
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
Ready
Sample based
Offset=2
T=3.000


ir,is (A)
File Tools View Simulation Help
<iar>
<ias>


N (rpm)
File Tools View Simulation Help
Ready
Sample based
T=3.000

```
Pn=3*746;
Vn=220;
fn=60;

Rs=.0435;
Lls=4e-3;
Rr=0.816;
Llr=2e-3;
Lm=69.31e-3;
Ls=Lls+Lm;
Lr=Llr+Lm;
J=0.089;
P=4;

ns=120*fn/P;
nm=1725;
we=2*pi*fn;
wm=nm/60*2*pi;
wr=wm*P/2;
s=(ns-nm)/ns;

Xlr=Llr*we*1i;
Xm=Lm*we*1i;
Xls=Lls*we*1i;

Zr=Rr/s+Xlr;
Zm=Xm;
Zeq=(Zm*Zr)/(Zm+Zr);
Zs=Rs+Xls;
Zt=Zs+Zeq;

Vs=Vn/sqrt(3);
Is=Vs/Zt;
Ir=(Vs-Is*Zs)/Zr;
S=3*Vs*conj(Is);
Pin=real(S);
Pls=3*abs(Is)^2*Rs;
Plr=3*abs(Ir)^2*Rr;
Pg=3*abs(Ir)^2*Rr/s;
Pmech=3*abs(Ir)^2*Rr*(1-s)/s;
Tdev=3*(P/2)*(Rr/(s*we))*(Vs^2)/((Rs+Rr/s)^2+we^2*(Lls+Llr)^2);
Tem=3/4*(P/we)*(Vs^2)/((Rs+Rr/s)^2+we^2*(Lls+Llr)^2)-Rs;
Tstart=3*(P/2)*(Rr/we)*(Vs^2)/((Rs+Rr/s)^2+we^2*(Lls+Llr)^2);
eff=Pmech/Pin;
```

Also used 1719 RPM



```
Command Window

>> %AT RPM=1725
>> Pin

Pin =

   2.1813e+03

>> Pg

Pg =

   2.1735e+03

>> eff

eff =

    0.9549

>>
```

```
Command Window
>> HW2EMACH
>> %AT RPM=1719
>> Pin

Pin =

   2.3505e+03

>> Pg

Pg =

   2.3419e+03

>> eff

eff =

    0.9515

>>
```

3.3)

When comparing 3.1 to 3.2 the efficiency is a bit different. When comparing the stator and rotor currents we can see that for 3.1:

$I_S=7.94\angle -40.86^\circ$

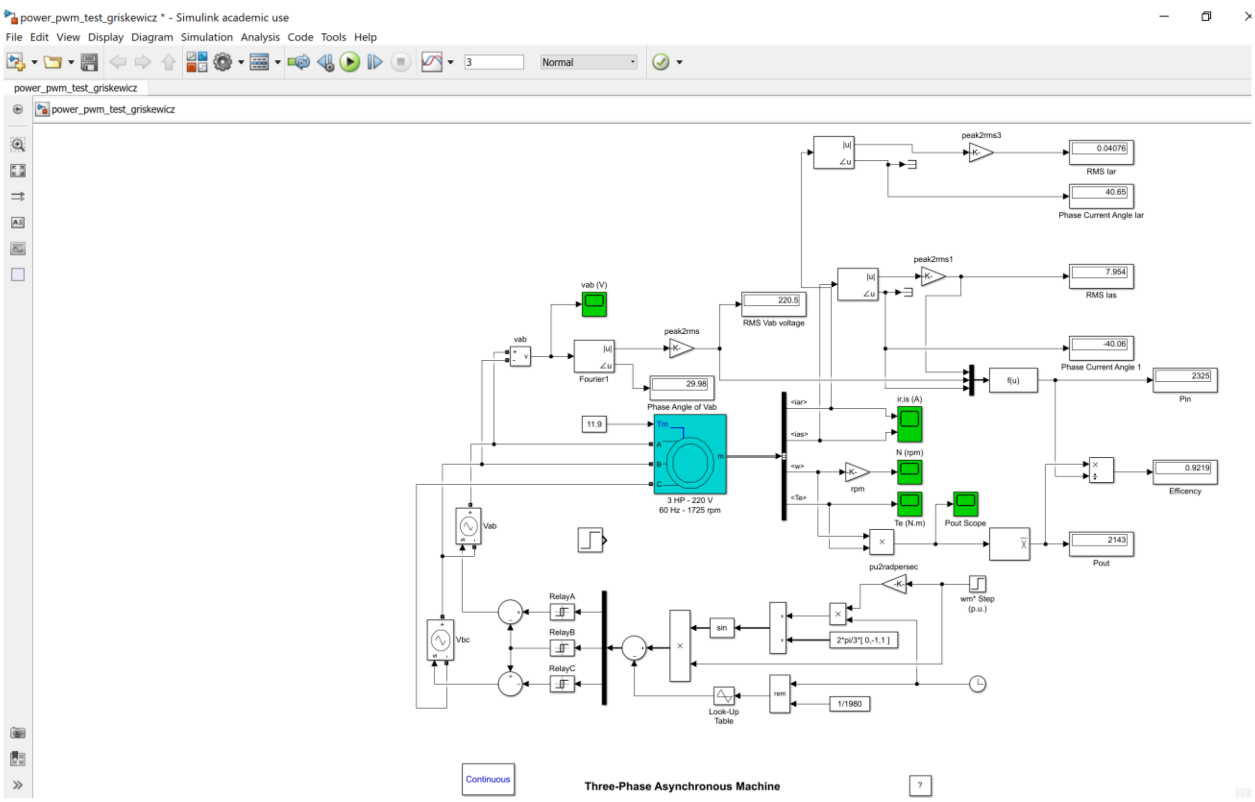
$I_R=7.07\angle 6.7^\circ$

When comparing the stator and rotor currents we can see that for 3.2:

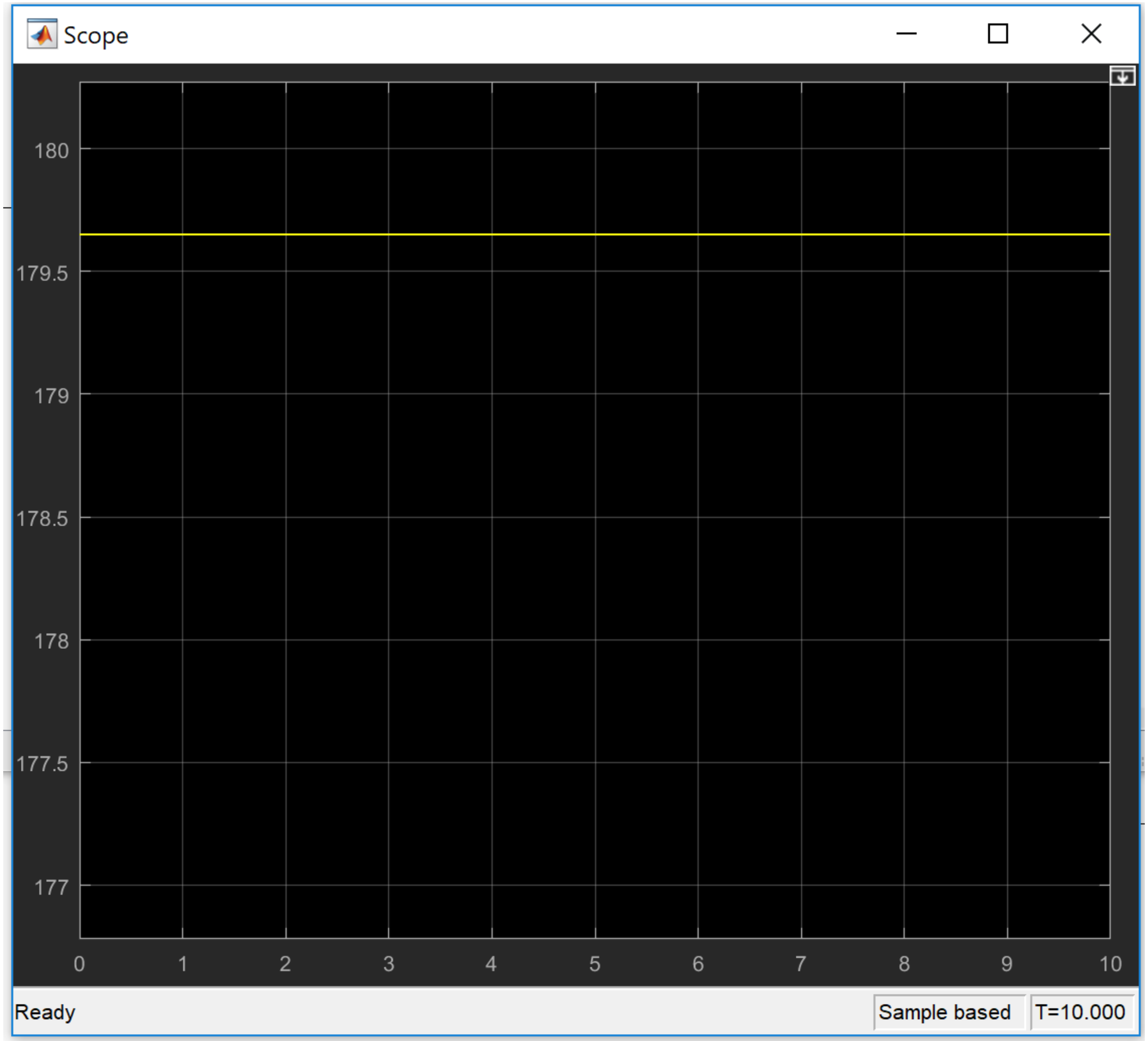
$I_S=8.11\angle -40.86^\circ$

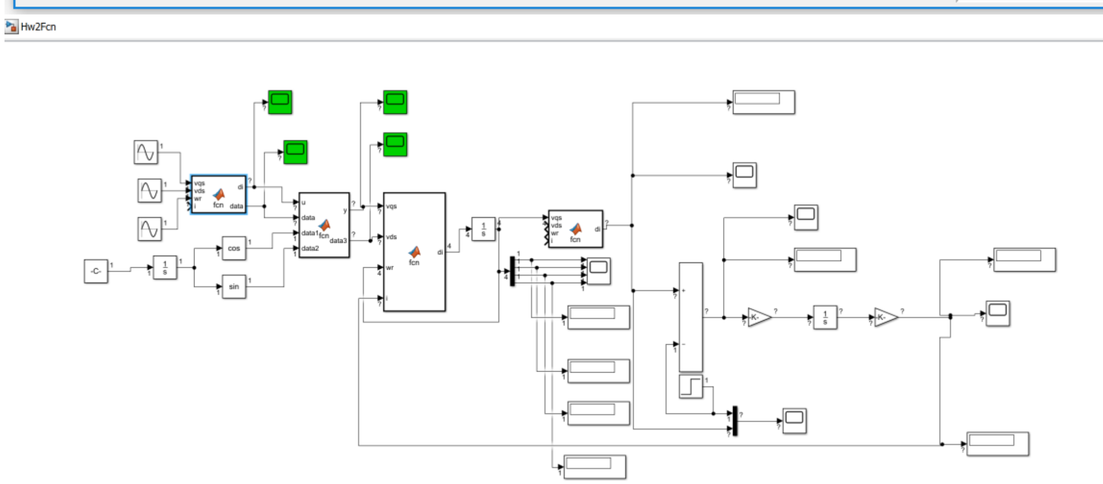
$I_R=6.53\angle -6.7^\circ$

Once again like the efficiency the values differ a bit, where the MATLAB script in 3.2 shows a higher value. This may be the reason for the better efficiency. Please note that MATLAB provided values in a complex form and I used a CASIO Fx-115ES to convert. I also tried to add an RMS reader for I_R as shown below:



3.4)


Scope
180
179.5
179
178.5
178
177.5
177
0
1
2
3
4
5
6
7
8
9
10
Ready
Sample based
T=10.000


Hw2Fcn