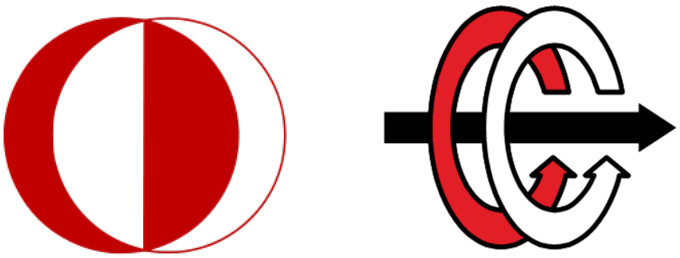
EE462 Spring 2016
Project 0

DC Motor Drive and Analysis

March 2017



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1 Brief Explanation

These report will try to explain and give information about DC Motor drive and analysis . The wanted specific details are,

- A short info about the motor (voltage, current, power ratings etc.)
- Short info about the power source and control system
- Graphs showing acceleration curve from stationary to rated speed
- Start-up current graphs
- Produced torque during startup

2 Results

In that project,I used Chopper-Fed DC Motor Drive Example.

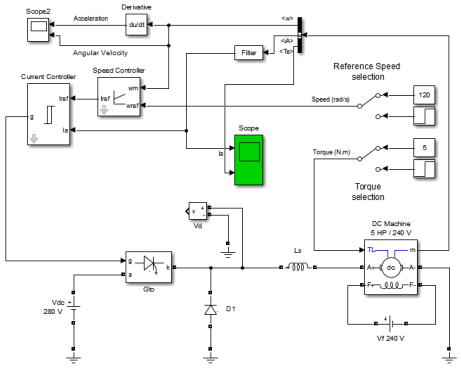

Figure 1: Simulink Diagram of Chopper-Fed DC Motor Drive

DC Motor Properties

I looked motor properties from Simulink DC Motor block,and properties are,

-240V
-Nominal 5A(Maximum 30A)
-$\approx 240 * 5 = 1.2kW$
-300V field voltage
-5 HP

-While looking and testing different motor selection, I realised that when I decreased the voltage of the field, field current was weakening .So,

- Induced Voltage(Ea) $\downarrow \rightarrow RotorCurrent(Ia) \uparrow \rightarrow MotorTorque(Tm) \uparrow$

Finally,when motor torque increased our acceleration will increase,so our speed will increase . Then our induced voltage will increase and hopefully our system will be again in steady-state .[2]

-!!! about HP calculation , because
HP = Volt*Ampere*eff/746
and if we choose our $HP = 1$,$Volt = 240V$,,$I = 5A$ our Eff≈ 3
That efficiency value is too small.Tomorrow I will look DC motor model again .

Power Source and Control Explanation

TODO
-Power Source and Control Explanation
-Graphs [OK]

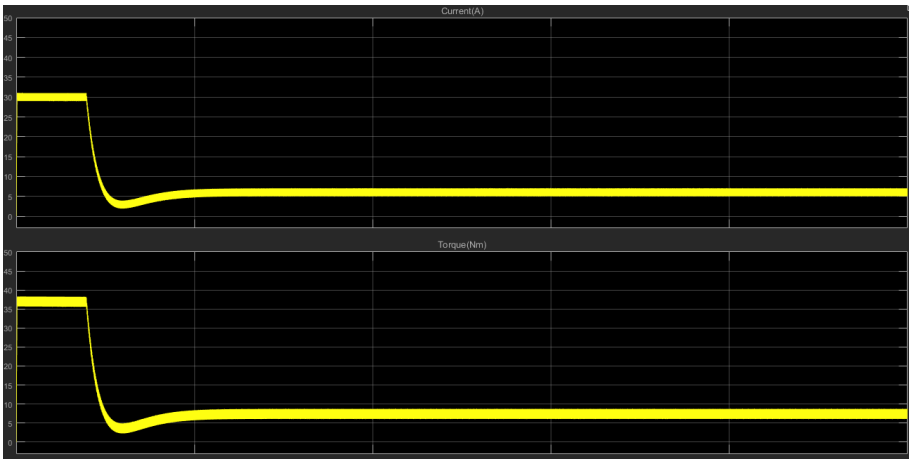

Figure 2: Torque and Current Graphs of DC Motor Drive

Figure 3: Acceleration and Velocity Graphs of DC Motor Drive

References

[1] H. Le-Huy *Universite Laval, Quebec.* SimScape Power Systems Examples, MathWorks

[2] https://www.quora.com/Why-do-we-decrease-the-field-current-in-a-DC-shunt-motor-by-to-increase-the-speed-and-mechanical-output-power *Quora.* (Loren Rademacher answer..)