

# **CHOPPER-FED DC MOTOR DRIVE**

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## Contents

Chapter 1. DC Motor Ratings .....	1
Chapter 2. Chopper-Fed DC Motor Drive .....	2
Chapter 3. Scope Views.....	3
Chapter 4. References.....	6

# Chapter 1. DC Motor Ratings

**DC Motor Parameters.** The DC motor ratings and parameters used in model is given below.

Rated Power( $P_{\text{rated}}$ ) : 5 HP

Rated Voltage ( $V_{\text{rated}}$ ) : 240V

Rated Current ( $I_{\text{rated}}$ ) : 15.5 A

Rated Speed ( $\omega_{\text{rated}}$ ) : 1750 rpm

Armature resistance : 2.581 ohm

Armature inductance : 0.028 H

Field resistance : 281.3 ohm

Field inductance : 156 H

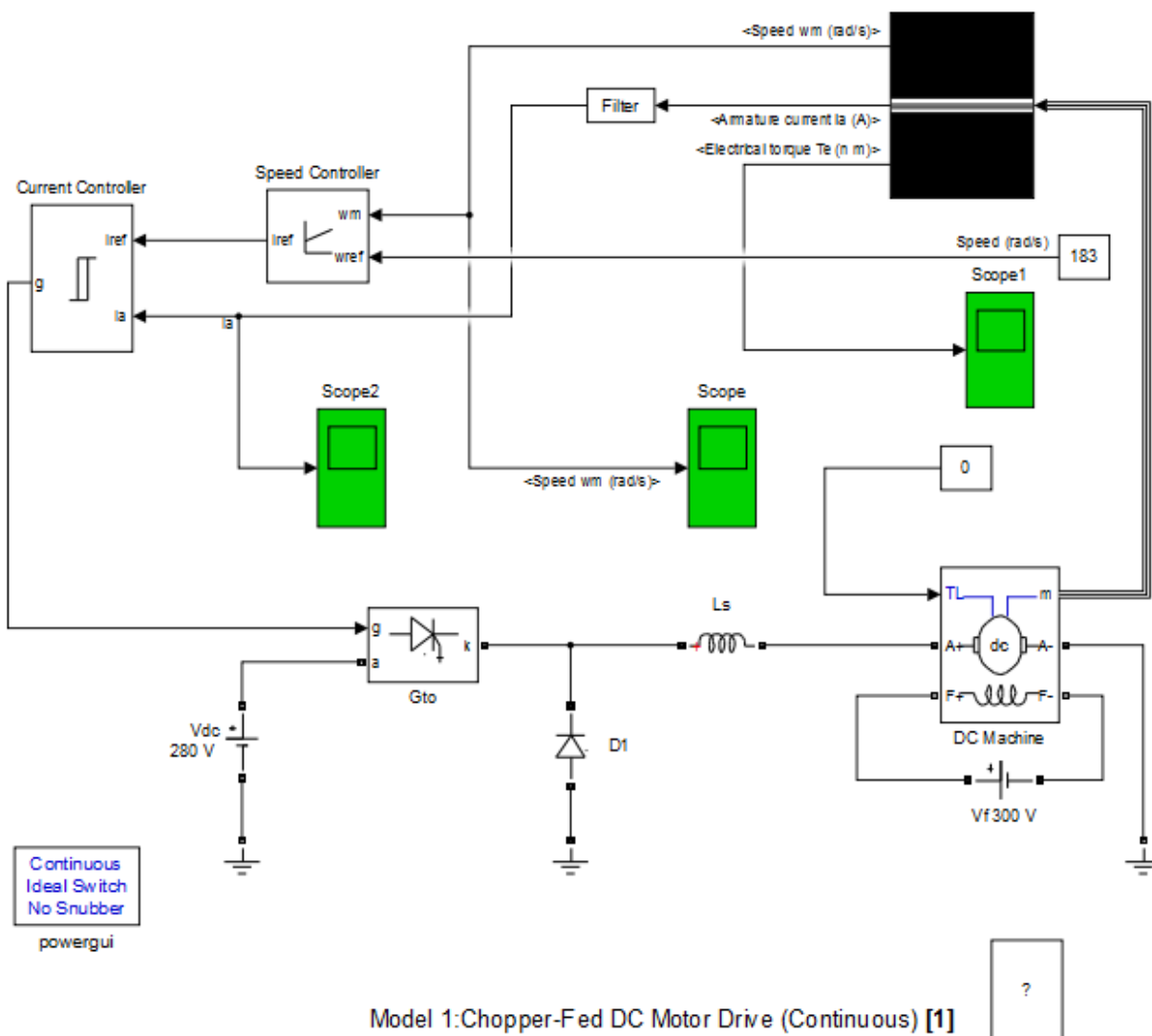
Total inertia(J) : 0.02215 kg.m<sup>2</sup>

Viscous Friction Coefficient( $B_m$ ) : 0.002953 N.m.s

## Chapter 2. Chopper-Fed DC Motor Drive

The model is given below. I made few changes on given model. Firstly, I changed the motor type. Since we need to increase the speed to the rated motor speed value, I rewrote the reference speed value to the 183 rad/s which equals 1750 rpm. I also reduced load torque to the 0. Lastly I added an electromechanical bus at the output of the bus selector.

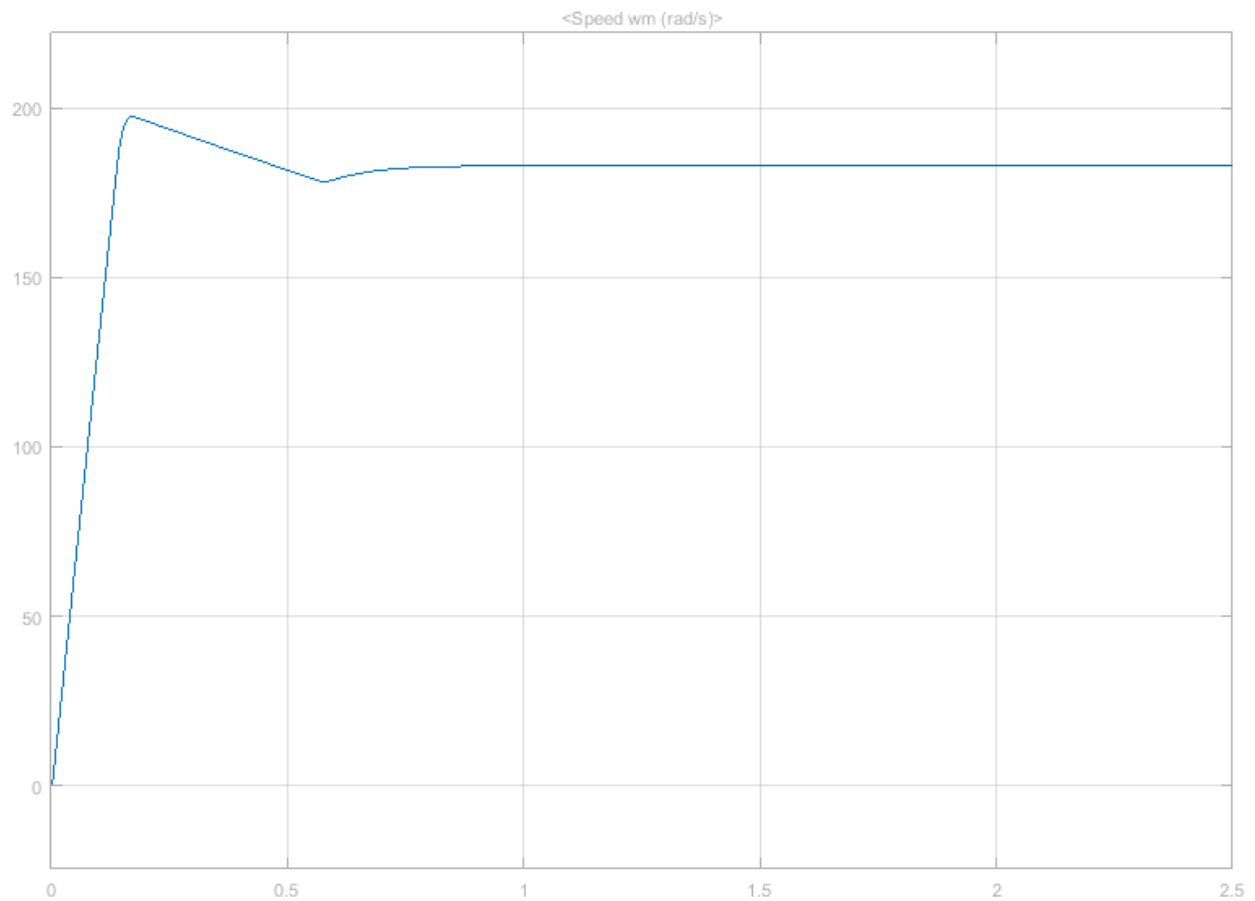
Now, I will briefly mention about the voltage source and control system. The DC motor is fed by the DC source through a chopper which consists of GTO thyristor and free-wheeling diode D1. GTO thyristor will be triggered by the hysteresis current controller. This block compares the armature current with reference current. Reference current created by the speed controller. This block compares the motor speed and reference speed (1750 rpm) and decrease the error with PI controller.



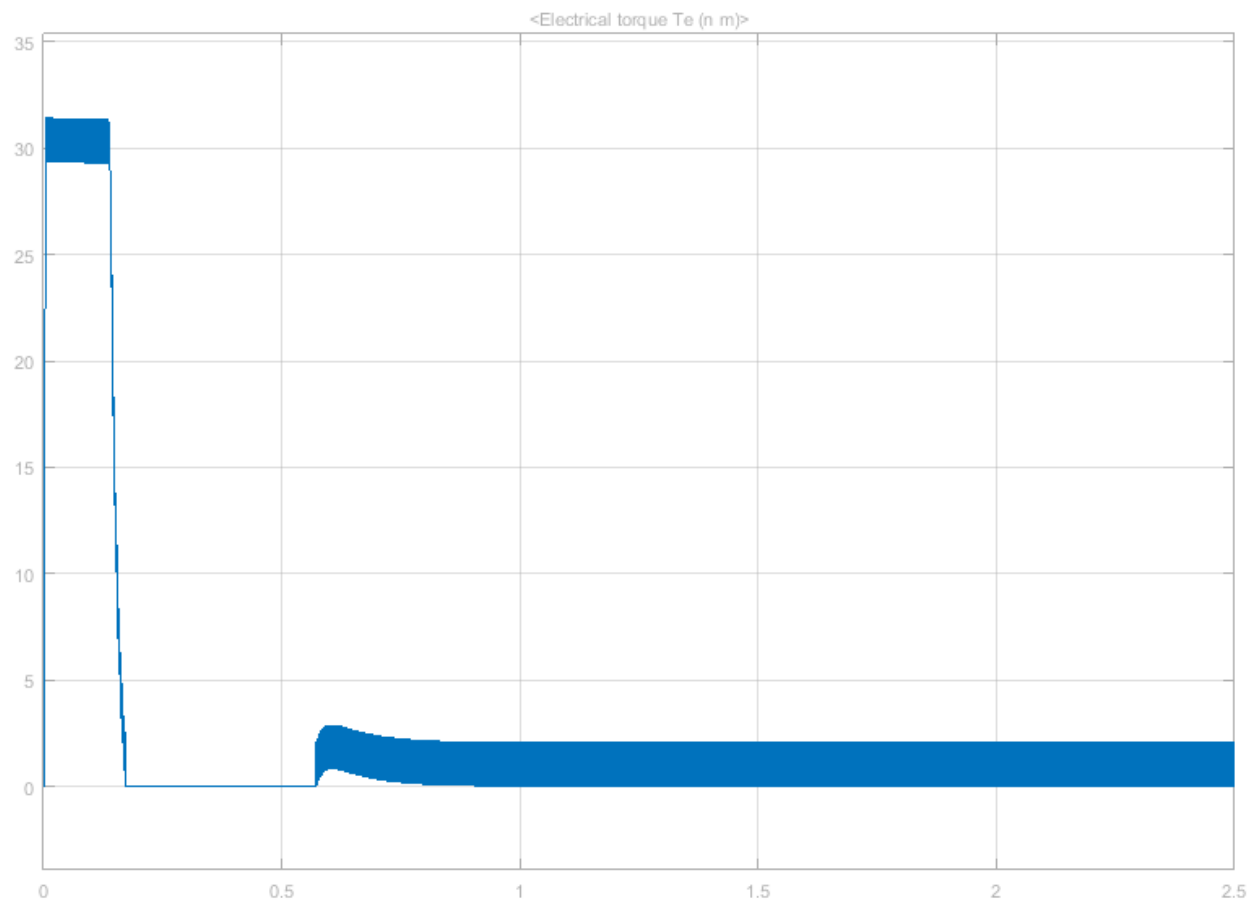
# Chapter 3. Scope Views

Acceleration graph, produced electromechanical torque graph during starting and start-up current graph are given in Figure 1.1 , Figure 1.2 and Figure 1.3 respectively.

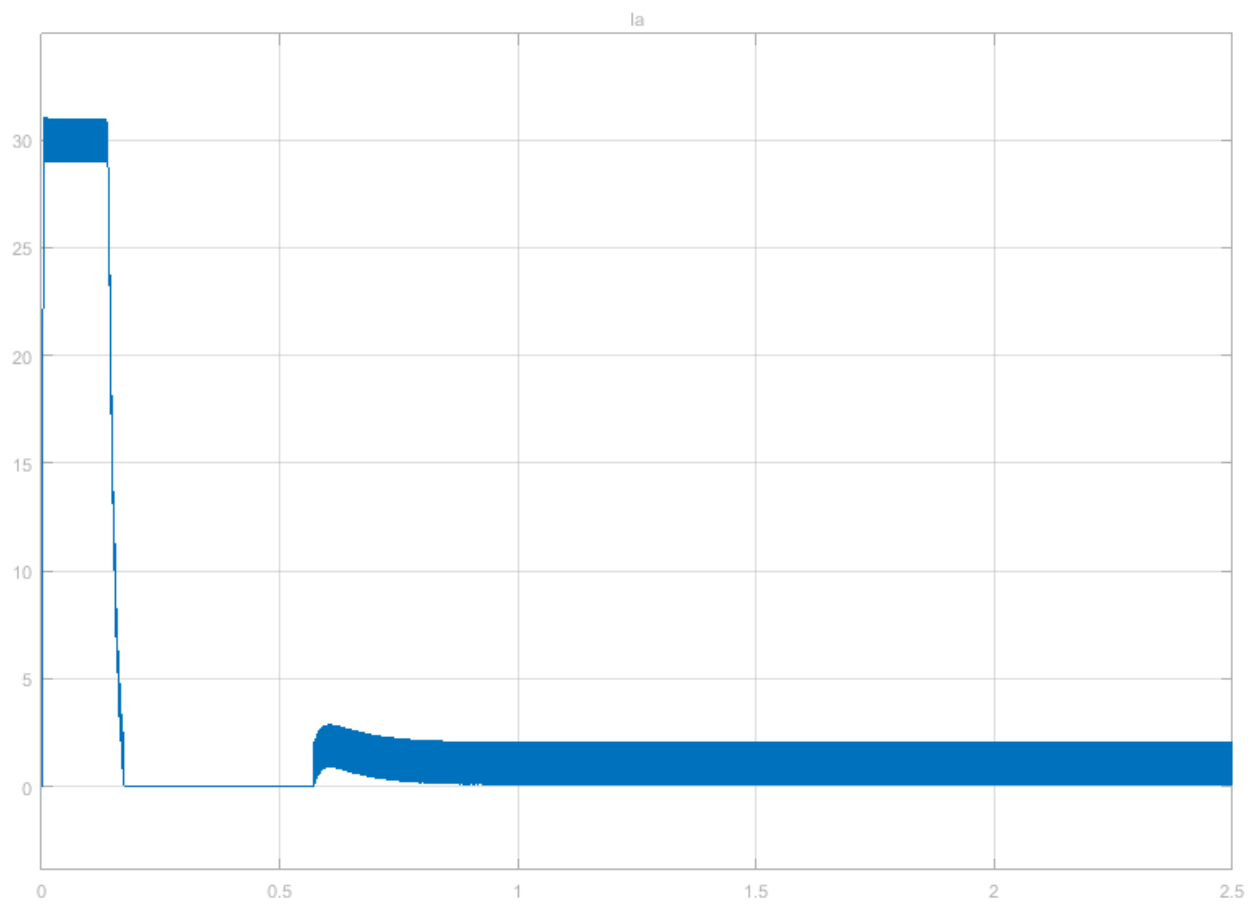
**Figure 1.1. Scope**



**Figure 1.2. Scope1**



**Figure 1.3. Scope2**





# Chapter 4. References

**References.** [1] H.Lehuy and G.sybille, MATLAB Help ver.7, Math works, Inc., 2004