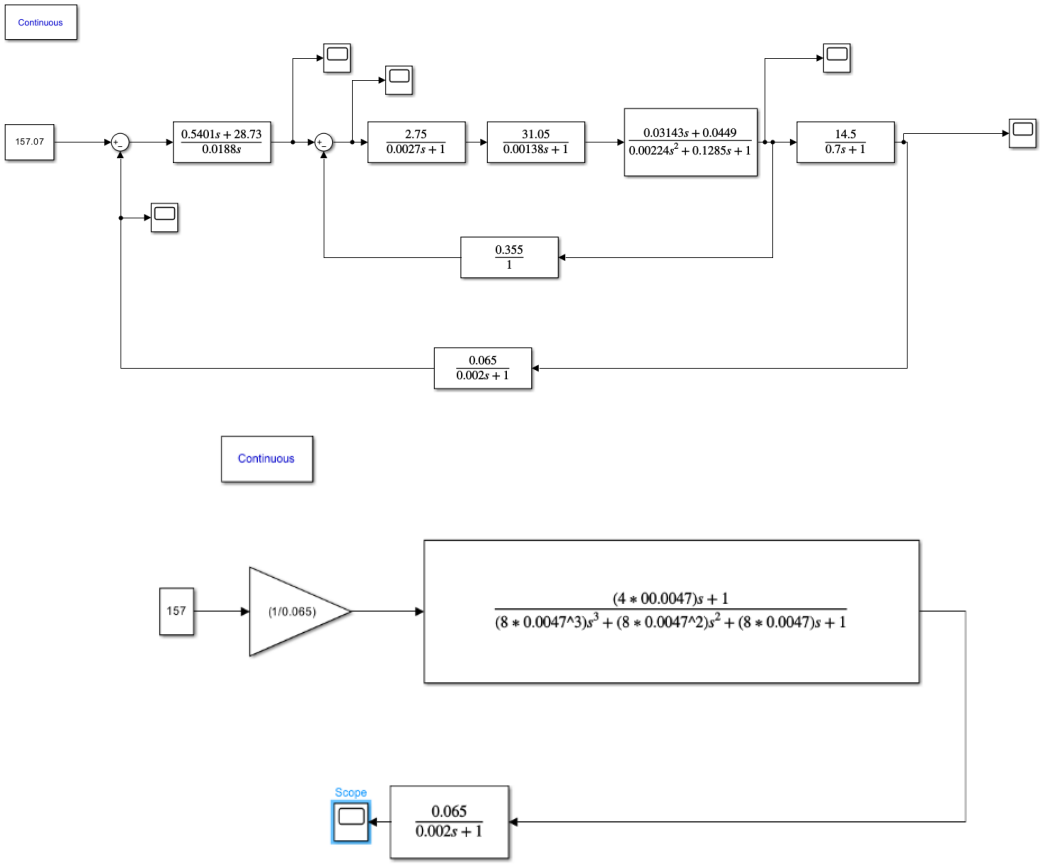
Power Electronics and Drive Assignment-2

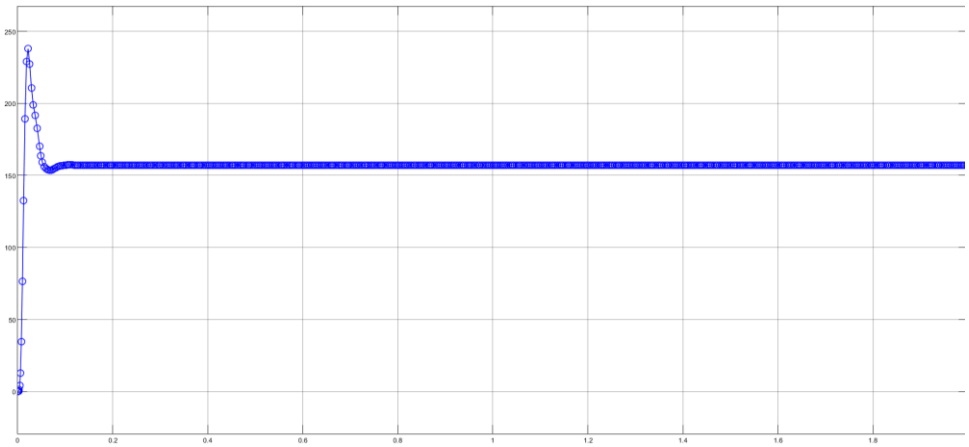
ANTU ROY (M230635EE)

Design a speed-controlled Dc motor drive maintaining the field flux constant. The motor parameters and rating are as follows; 220V, 8.3A, 1470rpm, Ra =4Ω, J=0.0607kg/m2, La = 0.072H, Bt = 0.0869N − m/rad/sec. Kb=1.26V /rad/sec. The converter is supplied from 230v, 3-phase AC at 60Hz.The converter is linear, and its maximum control input voltage is ±10V. The tacho generator has the transfer fucntion Gω(s) = 0.065/1+0.002s the speed reference has a voltage maximum of 10V. the maximum current permitted in the motor is 20A.

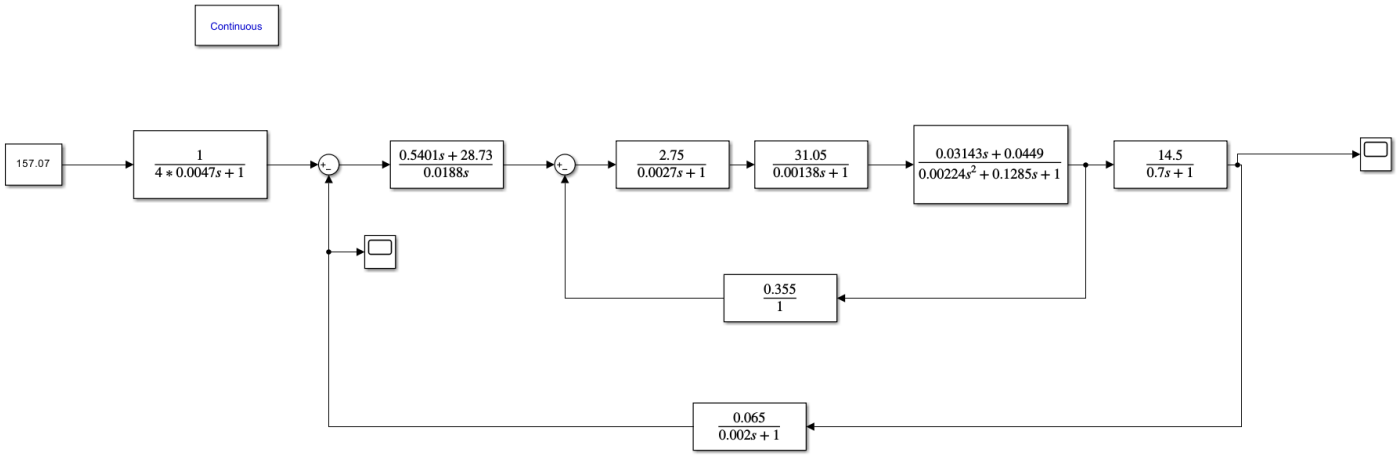
Speed Vs Time Response of the Speed Transfer Functions with and Without Compensated Model

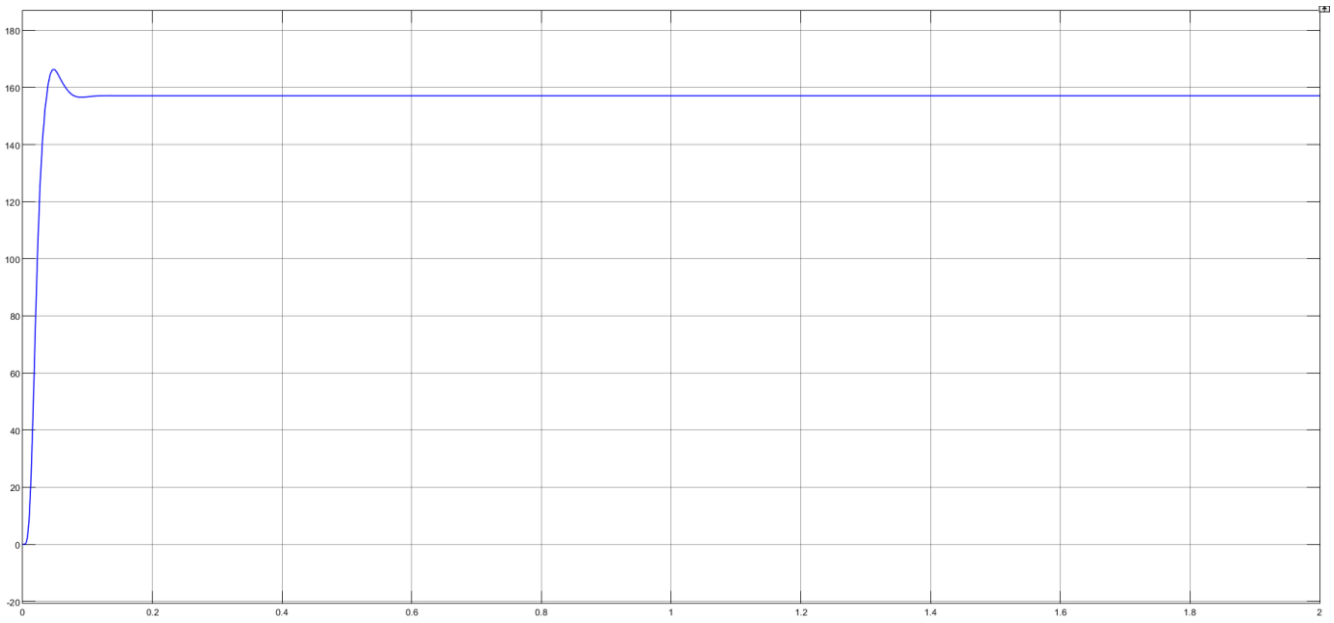
Uncompensated Model

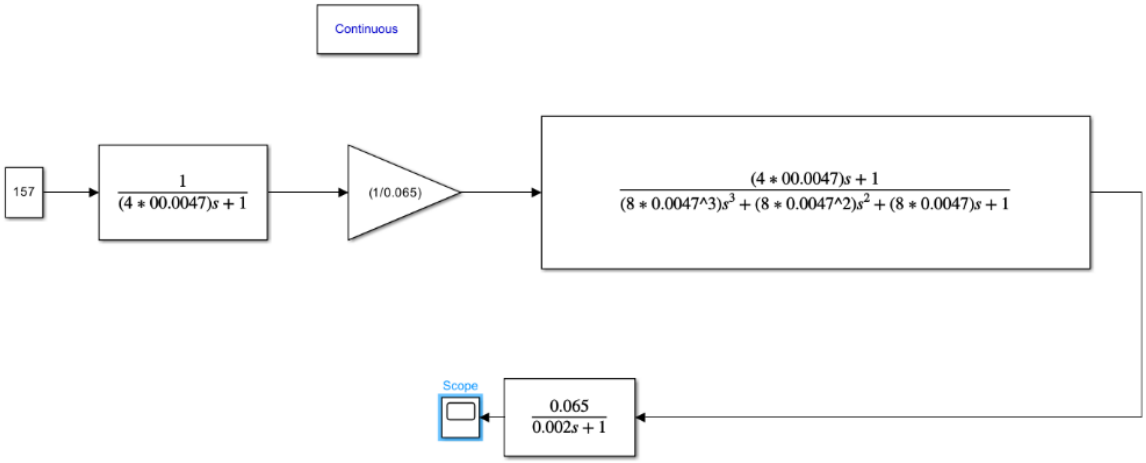


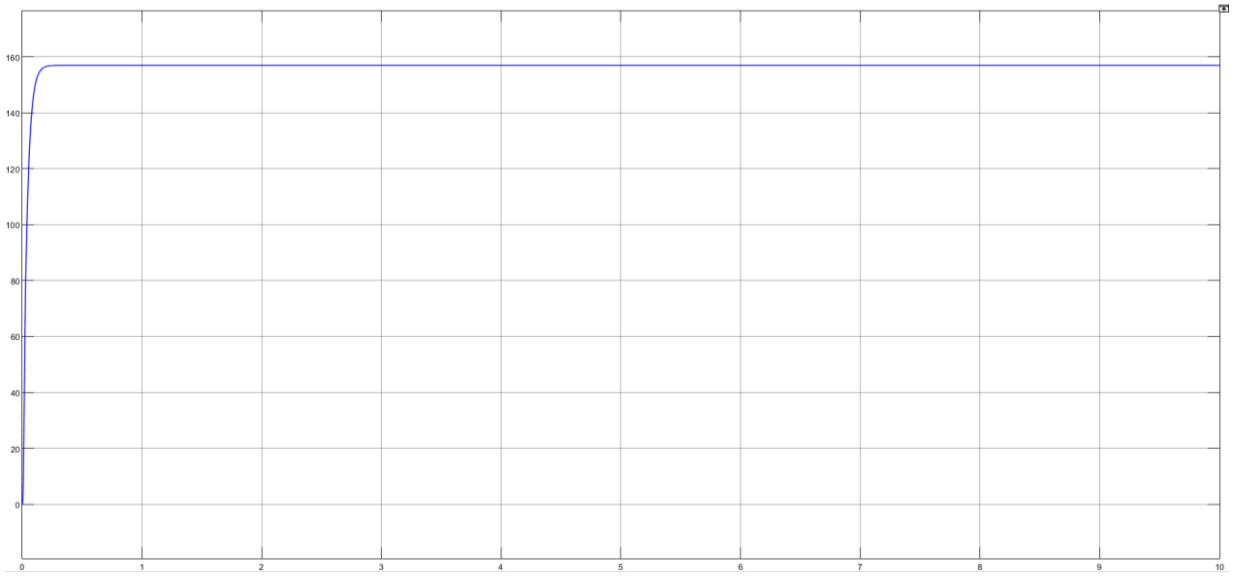


Compensated Model









Frequency Response of the Speed Transfer Functions with and Without Compensated Model

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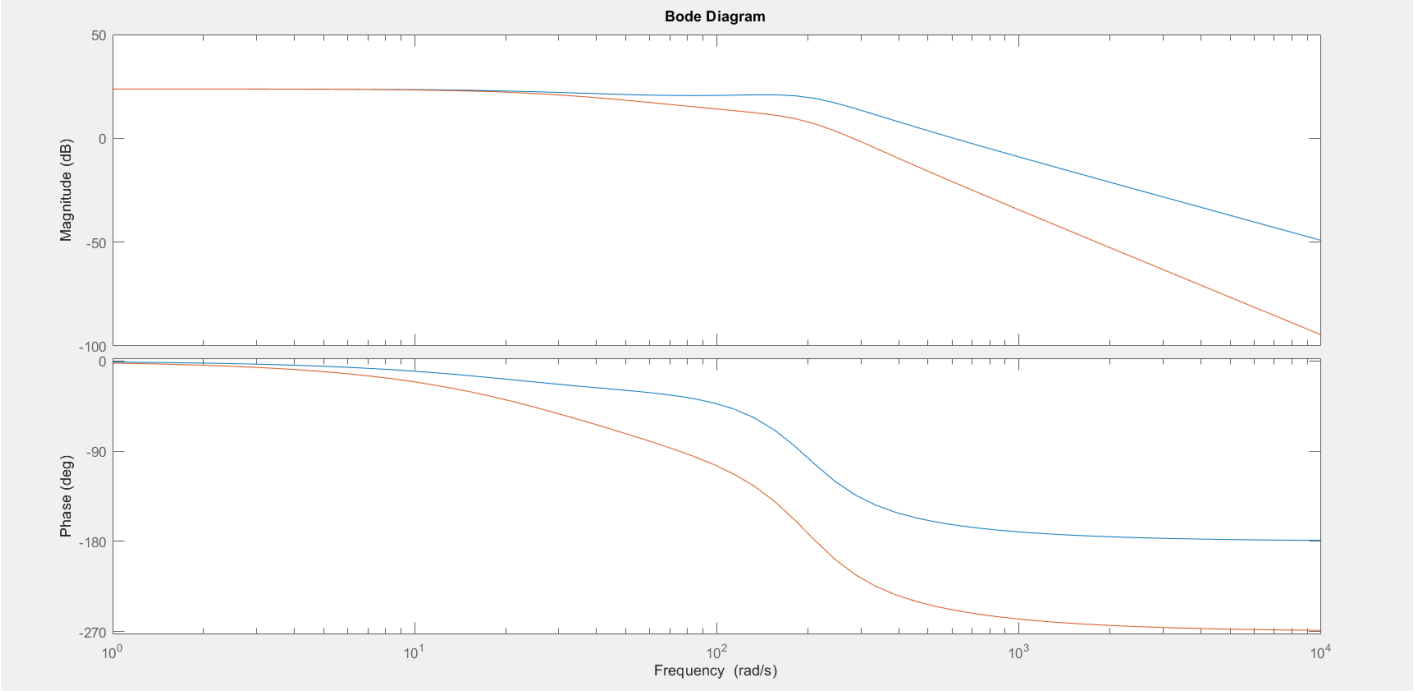
% Numerator
num = [0.2892 15.38];
% Denominator
den = [(8*0.0047^3) (8*0.0047^2)  (8*0.0047)  1];
% Transfer Function
G1 = tf(num, den)
% Plot Frequency Response
bode(G1), grid
% Numerator
num = [(1/0.065)];
% Denominator
den = [(8*0.0047^3)  (8*0.0047^2)  (8*0.0047)  1];
% Transfer Function
G2= tf(num, den)
% Plot Frequency Response
bode(G2), grid
bode(G1,G2)
```


Bode Diagram
Magnitude (dB)
50
0
-50
-100
Phase (deg)
0
-90
-180
-270
10^0
10^1
10^2
10^3
10^4
Frequency (rad/s)