


ECE 331 - Homework #10

DC Permanent Magnet Motors. Due April 23th, 4PM

A single SM24580 DC servomotor is to be used for an RC car.

<http://www.motiontek.ca/dcservomotor.html>

1) Determine (or estimate) the motor parameters: K_t , R_a , L_a , Inertia, Friction

<p>SM34580E500S \$225 CA 500 CPR, single ended Encoder Latching connector, cable 4'</p> <p>SM34580 \$125 CA Brushed DC motor only</p>	<p>SM34580 Servo Motor Specification Download Motor SM34580.pdf</p>	
 <p>Contact us for Viper 95 Driver & all required Connectors</p>	Frame Size	Nema34
	Constant Torque	118 oz/in – 0.8 N.M
	Peak Torque	580 oz/in – 4.09 N.M
	Continuous Current	7.3 Amp
	Peak Current	38 Amp
	Maximum Speed	5800 RPM ±10 % at 90V 3600 RPM ±10 % at 50V
	Resistance	0.993 ohm
	Inductance	1.75 mh
	Inertia	3.42 kg/cm ²
	Terminal Voltage	90 VDC
<p>US Digital E5 Encoder single end</p>		

One comment from battlebots is small wheels give you torque while large wheels give you speed. Assume you have a 90VDC power supply.

- 2) Plot the torque vs. speed for this motor assuming it directly drives a wheel with a diameter of 3cm
- 3) Plot the torque vs. speed for this motor assuming it directly drives a wheel with a diameter of 30cm

Assume your RC car has a mass of 20kg. Determine the time it takes your car to complete a 100m race

- 4) With 3cm wheels
- 5) With 30cm wheels

6-7) What is the optimal diameter of wheel for this motor / car combination in a 100m race?