Brushed Motor Test

Spring 2011

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In this test, a brushed motor, like the ones currently used in the robot Ranger, was attached to a large load motor. The PWM was adjusted in a program created previously in the lab. Two multimeters were connected to the system, one to check the voltage and the second one to measure the current. Additional data (motor velocity and current, and battery, current, velocity and voltage) was collected using the software RoboDisplay. The voltage was varied for each PWM and the values from the multimeters and RoboDisplay were recorded. Below is a table that summarizes the results. The test was ran twice, first with the motor spinning in the positive direction and then in the negative direction. The green cells are for positive direction and the red cells for negative.

Violeta Crow 6/3/11 3:34 PM
Comment: Specifics? (motor? Load?)

Violeta Crow 6/3/11 3:33 PM
Comment: What does "PWM" mean here?

	Current (A)											
PWM / Voltage	300		600	900	1200		1500		1800		2100	
0	0.001	0.006	0.001	0.002	0.002	0.003	0.001	0.002	0.001	0.004	0.001	0.002
3	0.001	0.004	0.001	0.001	0.001	0.004	0.001	0.002	0.002	0.003	0.001	0.002
6	0.001	0.004	0.002	0.005	0.005	0.006	0.007	0.009	0.011	0.007	0.011	0.01
9	0.002	0.004	0.008	0.016	0.015	0.015	0.025	0.033	0.026	0.032	0.028	0.033

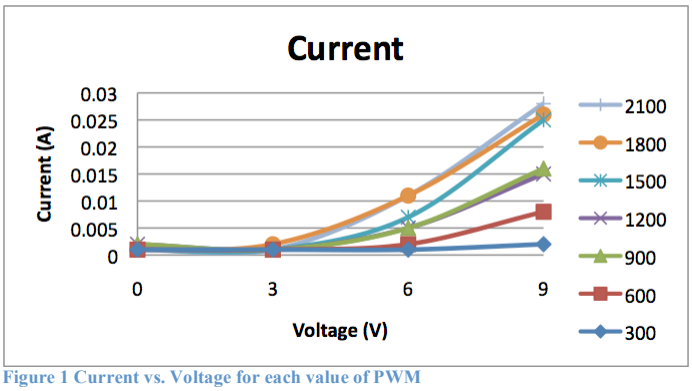

Figure 1 Current vs. Voltage for each value of PWM

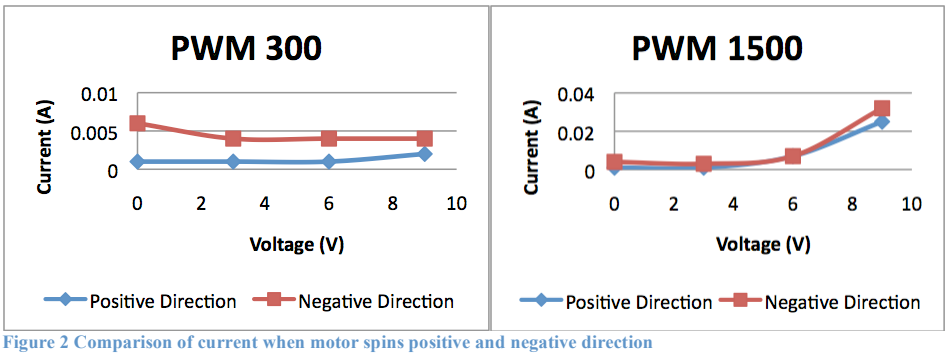

Figure 2 Comparison of current when motor spins positive and negative direction

The data shows that the current is relatively constant for all frequencies from 0 to 3V.

Afterwards, the current increases faster for higher frequencies. Another observation is that the value for the current in the negative direction trials is higher than in the positive direction.

Additional Details and Complete Data

- Date: February 14, 2011

- Materials used:
- Regulator Power supply. Model LCS-A-01
- CIC Ps-1930, DC Power Supply
- FLUKE True RMS Multimeter
- RoboDisplay software

- Controlled variables: PWM and voltage

- Dependent variables: Current

Cells shaded green correspond to a positive configuration, while the cells shaded red correspond to the opposite configuration.

PWM	Voltage (V)	Current (A)	Motor Velocity	Motor current (A)	Battery Power (W)	Battery Current (A)	Battery Voltage (V)
300	**0**	0.001	0.001678	0.005	0.2	0.007	25.03
300	**3**	0.001	195	0.0016	0.418	0.016	25.03
300	**6**	0.001	427	0.003	0.44	0.016	25.03
300	**9**	0.002	662	0.003	0.28	0.019	25.03
300	**0**	0.006	-0.0003	0.001	0.17	0.008	25.03
300	**3**	0.004	-190	0.0016	0.86	0.03	25.4
300	**6**	0.004	-430	0.005	0.9	0.03	25.03

300	**9**	0.004	-671	0.001	1.09	0.04	25
600	**0**	0.001	0.0001678	0	0.12	0.005	25.03
600	**3**	0.001	187	0.0016	0.3	0.012	25.03
600	**6**	0.002	421	0.003	0.49	0.016	25.03
600	**9**	0.008	665	0.003	0.57	0.018	25.03
900	**0**	0.002	0.00016	0.0016	0.49	0.018	25.1
900	**3**	0.001	193	0.0016	0.3	0.013	25.03
900	**6**	0.005	435	0.0016	0.6	0.021	25.03
900	**9**	0.016	669	0.0016	0.67	0.033	25.03
1200	**0**	0.002	0.00016	0.00168	0.1013	0.004	25.03
1200	**3**	0.001	191.5	0.0016	0.36	0.015	25.03
1200	**6**	0.005	428	0.0015	0.64	0.027	25
1200	**9**	0.015	670	0.015	0.97	0.027	25.03
1200	**0**	0.003	0.0001678	0.0016	0.1013	0.004	25.03
1200	**3**	0.004	-197	0.00168	0.49	0.021	25.1
1200	**6**	0.006	-439	0.0018	0.86	0.034	25.03
1200	**9**	0.015	-675	0.0016	0.86	0.04	25.03
1500	**0**	0.001	0.0001678	0.0016	0.08	0.003	25.03
1500	**3**	0.001	203	0.0016	0.4	0.015	25.03
1500	**6**	0.007	435	0.0023	0.73	0.03	25.03
1500	**9**	0.025	676	0.003	0.9	0.04	25.03
1500	**0**	0.002	0.001678	0.0016	0.08	0.003	25.03
1500	**3**	0.002	-197	0.0016	0.44	0.017	25.1
1500	**6**	0.009	-437	0.116	0.9	0.04	25.1
1500	**9**	0.033	-658	0.01	1.2	0.04	25.13
1800	**0**	0.001	0.0001678	0.003	0.07	0.003	25.03
1800	**3**	0.002	206	0.005	0.49	0.016	25.03
1800	**6**	0.011	426	0.01	0.6	0.03	25.03
1800	**9**	0.026	672	0.02	0.8	0.05	25
1800	**0**	0.004	0.0001678	0.001	0.076	0.003	25.03
1800	**3**	0.003	-191	0.001	0.48	0.02	25.1
1800	**6**	0.007	-430	0.001	0.8	0.03	25.13
1800	**9**	0.032	-667	0.002	0.7	0.04	25.16
2100	**0**	0.001	0.00016	0.001	0.06	0.003	25.03
2100	**3**	0.001	193.8	0.003	0.45	0.017	25.03
2100	**6**	0.011	432	0.01	0.89	0.04	25
2100	**9**	0.028	676	0.003	1.5	0.04	25
2100	**0**	0.002	0.001678	0.003	0.06	0.003	25.03
2100	**3**	0.002	-194	0.003	0.5	0.02	25.1
2100	**6**	0.01	-430	0.02	1.2	0.04	25.1
2100	**9**	0.033	-667	0.03	1.5	0.03	25.16