Physical Setup



\* moment of inertia of the rotor (J) = 0.01 kg.m^2/s^2
\* damping ratio of the mechanical system (b) = 0.1 Nms
\* electromotive force constant (K=Ke=Kt) = 0.01 Nm/Amp
\* electric resistance (R) = 1 ohm
\* electric inductance (L) = 0.5 H
\* input (V): Source Voltage
\* output (theta): position of shaft
\* The rotor and shaft are assumed to be rigid

The motor torque, **T**, is related to the armature current, **i**, by a constant factor **Kt**. The back emf, **e**, is related to the rotational velocity by the following equations:



After writing Newton's law and Kirchoff's law:



The angular acceleration is equal to 1/J multiplied by the sum of two terms (one pos., one neg.). Similarly, the derivative of current is equal to 1/L multiplied by the sum of three terms (one pos., two neg.).

J=0.01;

b=0.1;

K=0.01;

R=1;

L=0.5;