ECEN Lab Notebook

January 14th to ####

**Background**

Motor Model

J = moment of inertia of the rotor (kg.m^2)

K­m = electromotive force constant (V/rad/s)

KT = motor torque constant

b = motor viscous friction constant

R = resistance

L = inductance

For this analysis, İ and b are considered negligible. Adjusting for this and applying the Laplace transform yields:

Where , and 1/Km = K

Multi-sine

Can use a multi-sine to test a long list of different frequencies all at once. Restrictions on the frequencies to test are that it must be a multiple of 2π/T (where T is the test duration) and must be less than the Nyquist frequency, π/dt. This means the frequencies tested is the list 2π/T: 2π/T: π/dt. To find the input, each frequency is run the signal equation and the results are summed into a single vector:

:

Time is a vector from 0 to T incremented by the user selected dt. The vector can then be converted into the frequency domain using a Fourier transform, in this case the FFT function in MATLAB.

**Results**

Show plotting a single frequency and the effect of sampling a frequency that is slower than Nyquist and not on the write frequency resolution.

**Discussion**

In order to obtain steady state results and ignore the initial transient effect, multiple iterations of T could be run, with the last cycle being used for analysis.