MEEM/EE 5750 Lab 1

Modeling in MotoHawk and Calibration in Mototune

Objectives

- Get familiar with MotoHawk and MotoTune
- Develop ECM project model using Simulink and MotoHawk
- Generate binary code using MotoHawk auto-code generation. Program ECM using MotoTune
- Perform Calibration using display, calibration, and override functions
- Using charts to display Sine and Cosine waves
- Use Log function to record data to a data log file
- Use Data Write Block and Data Definition Block to save the data for a Scalar, Vector, or Matrix

Basic Components

- Create a lab model using MotoHawk Calibration blocks, Probe blocks, Override blocks, Data Write Block, Data Definition Block, and other Simulink blocks
- Use calibration blocks to tune systems parameters such as frequency and amplitude of Sine and Cosine waves
- Use probe blocks to display the values of sine and cosine waves
- Override block: place between the output of angle calculation and the sine and cosine blocks
- Set the initial values of frequency, SineAmplitude, or CosineAmplitude to 1

Basic Lab Tasks and Report Requirement

Following are **basic** lab tasks and report requirement. You are encouraged to explore more to receive a good lab grade.

1. Generate a Sine wave and a Cosine wave. The frequency and the amplitude of Sine and Cosine waves are adjustable in real-time.

2. Design a user defined function to use generated Sine and Cosine waves

3. The default value of frequency $f = 1$, The amplitude of Sine wave $SineAmplitude = 1$ and Cosine wave $Co\sin eAmplitude = 1$

Basic Lab Tasks and Report Requirement (Cont.)

4. When f=1, SineAmplitude=1, and CosineAmplitude=1
   - Include Simulink Scope displays of Sine and Cosine waves in your report
   - Create a display panel and a calibration panel in MotoTune. Drag display and calibration variables to the display and calibration panels. Capture display and calibration panels, and include them in your report
   - Open charts to display Sine wave, Cosine wave, and the output of user defined function. Include these charts in your report.
   - Log Sine and Cosine data. Include data log files in your report. Discuss the content of the log files.

Basic Lab Tasks and Report Requirement (Cont.)

5. Change the values of calibration variables, such as frequency, SineAmplitude, CosineAmplitude, and calibration variables in user defined function. For example,
    - change f =1 to 0.5 and 0.1
    - change SineAmplitude=1 to 5 and 10
    - change CosineAmplitude=1 to 5 and 10
    - ……

    Capture Since wave, Cosine wave, and the output of user defined function charts for each change and included these charts in your report.

Basic Lab Tasks and Report Requirement (Cont.)

3. Compare Sine and Cosine waves when
   - Select Angle_Override_ovr = Pass-Through
   - Select Angle_Override_ovr = Override
4. Will the change of frequency value affects Sine and Cosine waves when Angle_Override_ovr = Pass-Through?
5. Will the change of frequency value affects Sine and Cosine waves when Angle_Override_ovr = Override?
6. Will the change of SineAmplitude and CosineAmplitude values affects Sine and Cosine waves when Angle_Override_ovr = Override?
7. Capture Since and Cosine charts for each scenario and

   included these charts in your report.

Basic Lab Tasks and Report Requirement (Cont.)

8. When f=1, SineAmplitude=1, CosineAmplitude=1, and Angle_Override_ovr = Pass-Through, gathering the data points of Sine, Cosine, and the output of user defined function using Data Write Block and Data Definition Block. Set the length of data vectors to be 400.
9. Copy Data Write Block data to Excel. Include Excel plots in your report. Compare Excel plots with MotoTune Charts.
10. Compare two data recoding functions: data logging and gathering data using Data Write Block and Data Definition Block.
11. Submit your model file along with lab report.