

22.302 Development of Labview GUI Interface

Introduction

Labview is a powerful software package that is used to create virtual instruments as well as interface to a variety of different hardware devices. This project is intended to familiarize the student with the basic Graphical User Interface (GUI) and develop two modules to study the time and frequency effects of signals and filtering.

Assignment – Fourier Series Approximations

Using Labview, generate a summation of sine waves to approximate a square wave. Also, generate a square wave as a reference for overlay plot comparison. This comparison is to be made on the time signals of these waves.

The time signals are also to be transformed to the frequency domain using the FFT in Labview. (Make sure that the periodicity requirements of the Fourier Transform are satisfied so that leakage is not a concern for this processing.) Generate overlay frequency plots for easy comparison of these spectrum.

In generating the Labview GUI, make sure that user input controls are available for the amplitude of each of the sine waves along with the primary frequency of the signal evaluated. It is also important to have the GUI continuously update as parameters are changed.

A MATLAB GUI is available as a guide to some of the Fourier Series material on the ME Lab course webpage – both the description of the GUI and the GUI itself are available with the Labview related materials on the webpage. (It would be wise to run this first and read the documentation along with it as a prelab).

Assignment – Low Pass Filter

Using Labview, generate a low pass filter (1st order Butterworth) and apply it to the Fourier Series GUI above. Select a cutoff frequency (that is variable via a control) to filter the higher frequencies of the summed Fourier series of sine waves. Note the effects of the filter on both the time and frequency signals.

Post-Lab Analysis – **INDIVIDUAL REPORT**

Write a short memo report describing the Labview models created. Include the GUI interface screen shot to help describe the model generated. The Labview GUI **MUST** be handed in as part of this work for review with the report.