

Using the demo VI for FAST2Labview

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The “DEMO” LabVIEW program is intended to provide a simple illustration of how one could set up a LabVIEW program to call the FAST DLL.

Getting setup

You'll need to have a compiled FAST DLL (i.e., FAST_RT_DLL.DLL) somewhere where LabVIEW can find it.

Additionally, you'll need to upload your desired FAST input files into the system folder of the NI real-time computer. In our case this is: ni-rt/system/

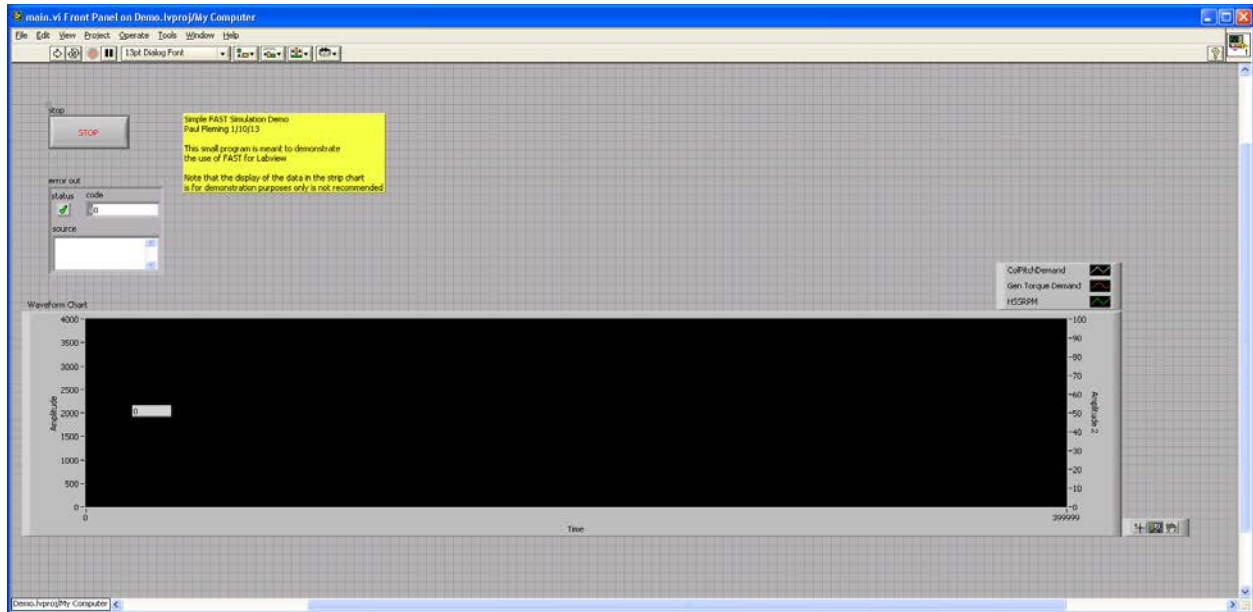
In this example, a model of the NREL 5-MW Reference wind turbine is used so the following files and folders have been placed in the directory:

Filename	Description
NRELOffshrBsline5MW_Onshore.fst	Primary File
NRELOffshrBsline5MW_AeroDyn.ipt	Aerodyn Input File
NRELOffshrBsline5MW_Blade.dat	Blade Structural Data
NRELOffshrBsline5MW_Tower_Onshore	Tower Structural Data
AeroData/	Folder of airfoils
Wind/	Example wind inputs

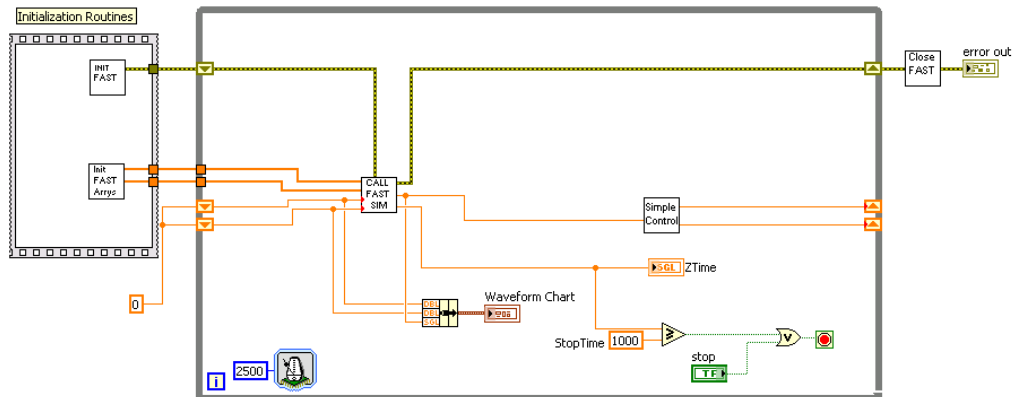
The demo project

Filename	Description
Demo.lvproj	Project file, open this to load demo into LabVIEW
Main.vi	Main program file, run this file to run program
RT Init FAST.vi	Call FAST initialization routine
RT Init FAST Arrays	Set up arrays for passing to FAST
RT Call Fast SIM	Call FAST DLL Simulation function
RT SimpleControl	Implementation of simple pitch and torque feedback control
RT Close FAST	Call FAST Close Routine

The demo consists of a main project file and several Vis. Open “Demo.lvproj” to load the project. Once the project is loaded open the main file “Main.vi”. You will then see the following:



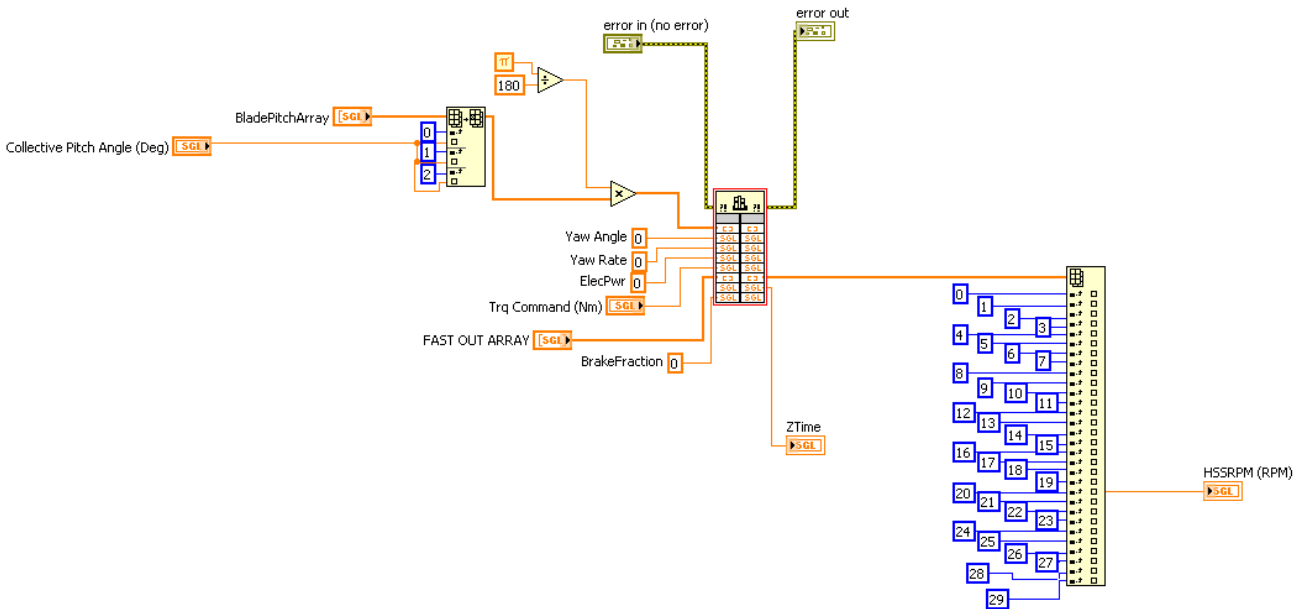
The main program simply runs the FAST simulation with a very simple controller and outputs the value of the HSSRPM, generator torque and pitch angle to a waveform chart. Looking at the Block Diagram:



The essential operation of the program is shown. On the left, the FAST is initialized, along with some arrays used. In the central loop, FAST and a simple controller are called once per time step. Finally, upon a certain time expiring or the user hitting stop, the program exits and the close FAST routine is called.

The INIT FAST routine calls the DLL initialization routine. It accepts as an input the name of the primary file (.fst) used for the current simulation. In our case this is: "NRELOffshrBsline5MW_Onshore.fst".

Call Fast Sim is shown below:



This routine collects the inputs to FAST, calls the simulation routine, which advances the simulation one time step then collects the outputs. Note that the output array is determined by the FAST input file. For this example we then select from the array only the HSSRPM value.

Finally, the simple control block is meant to implement basic feedback control for the pitch and torque loops.