How to Use the Fast Fourier Transform (FFT) Function and the Inverse Fast Fourier Transform Function (Inverse FFT)

Functions -> Signal Processing -> Transforms -> FFT

Functions -> Signal Processing -> Transforms -> Inverse FFT

Start by opening the Functions palette and opening the Signal Processing sub-palette. Under Signal Processing select the Transforms sub-palette where you will find the FFT and Inverse FFT functions.

Using the Fast Fourier Transform Function

The Fast Fourier Transform function takes in a set of data at the input terminal X as shown below in Figure 1 and computes the fast Fourier Transform which is produced at the output terminal labeled FFT{X}

Figure 1

The FFT size input specifies how many sample values you want to apply the fast Fourier Transform operation to. The default value is the size of the input but if other values are specified, the first n will be used. If X has less than n samples, then the FFT function will pad the input with enough zeros to implement the number of samples specified.

For example, supposed we want to take the fast Fourier Transform of a square wave. Illustrated in Figure 2 is an implementation of how we would apply the FFT function to obtain the frequency spectrum of a square wave with a period of 200 samples.

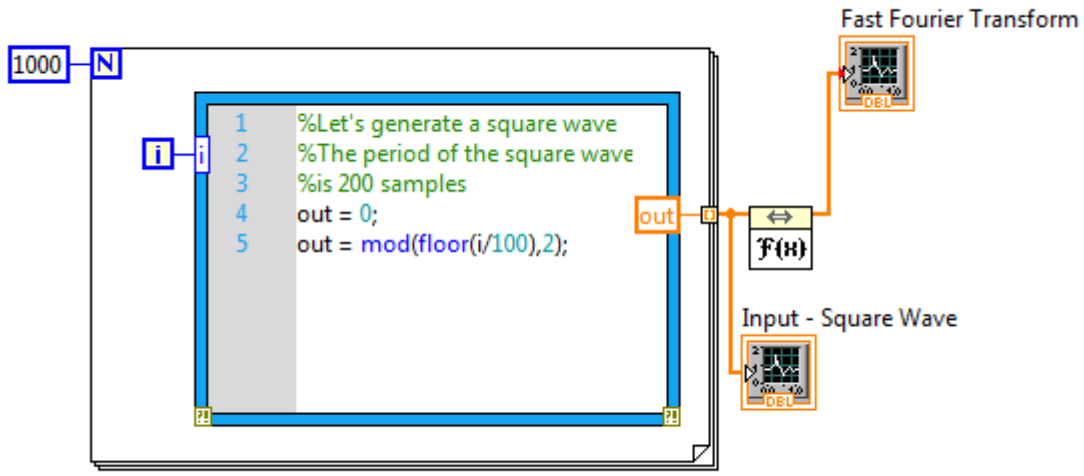

Figure 2

The corresponding outputs are shown below in Figure 3 for the square wave and the fast Fourier Transform of the square wave.

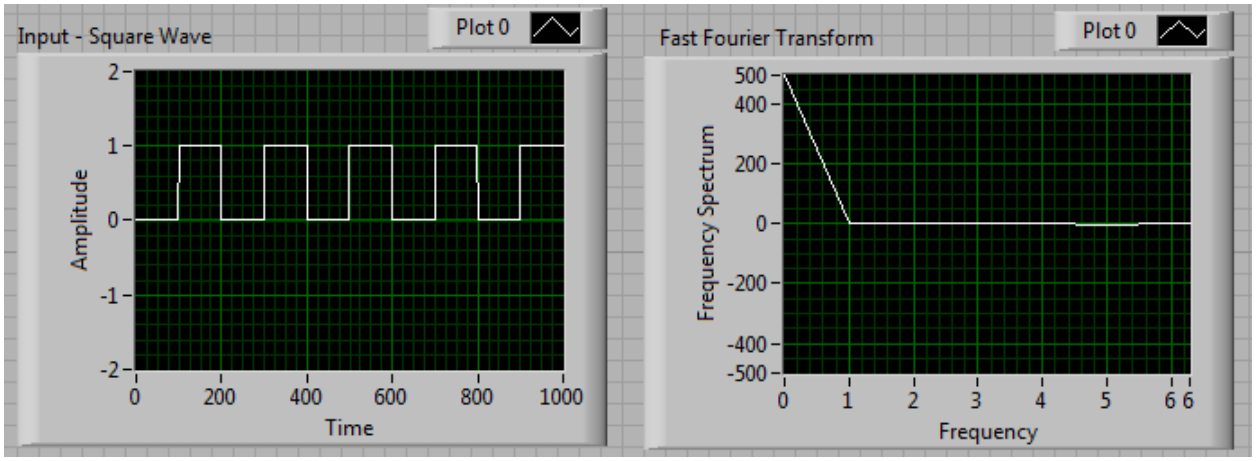

Figure 3

Using the Inverse Fast Fourier Transform Function

The Inverse Fast Fourier Transform (Inverse FFT) function takes in a waveform the represents the frequency spectrum and reconstructs the waveform based on the magnitudes of each frequency component.

Figure 4 illustrates how the Inverse Fast Fourier Transform can take a square wave with a period of 20 samples for 50 cycles (resulting in a spectrum of 1000 samples) and generate its associated signal in Figure 5.

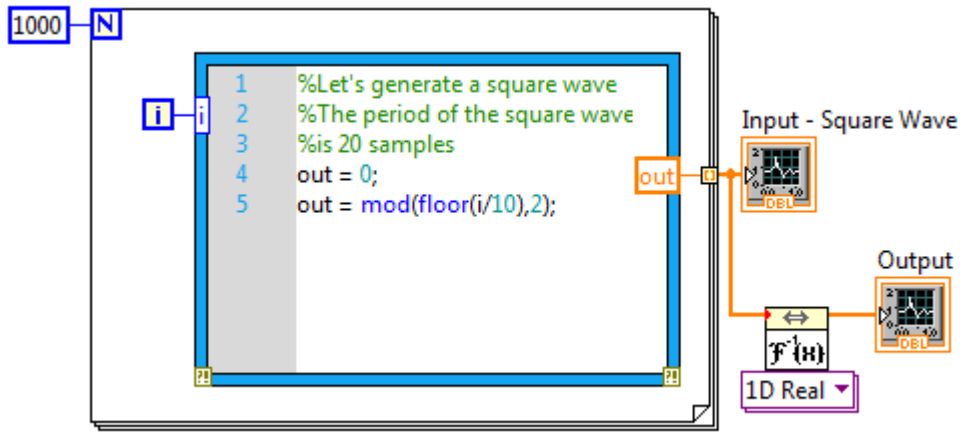

Figure 4

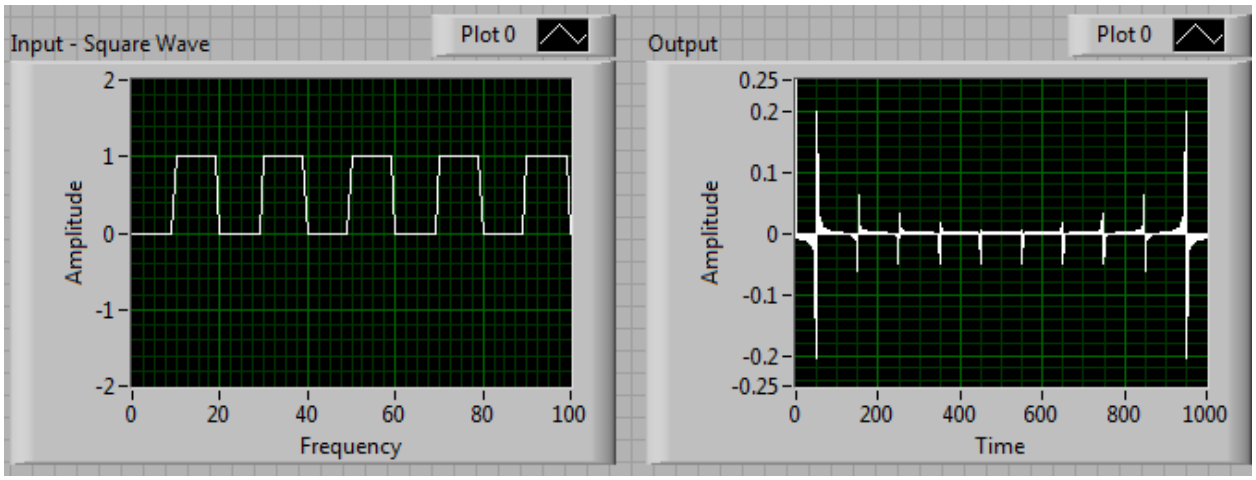

Figure 5

In addition, we note that the Inverse Fast Fourier Transform should be able to produce the original input signal if we apply it directly after the Fast Fourier Transform as shown in Figure 6. We see that the output of this system does result in the original signal as shown in Figure 7.

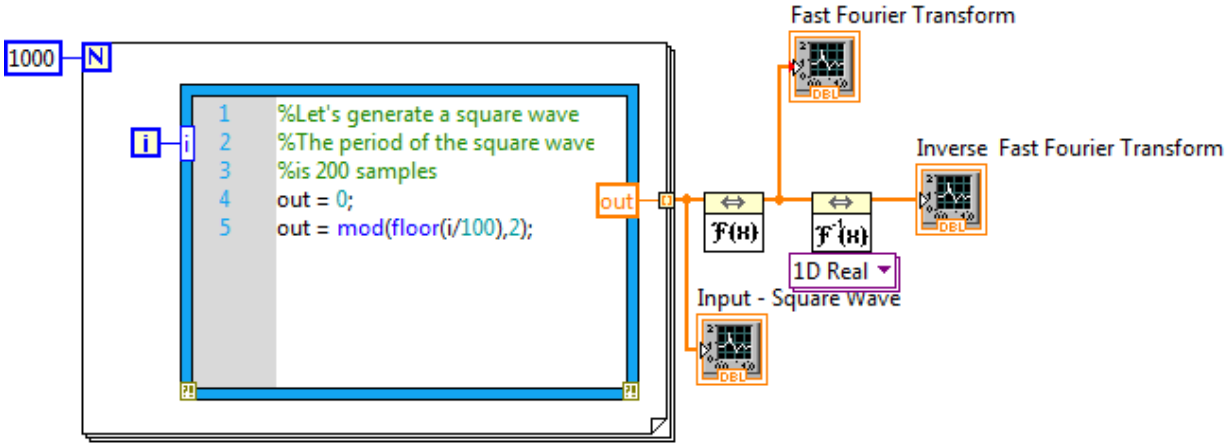

Figure 6

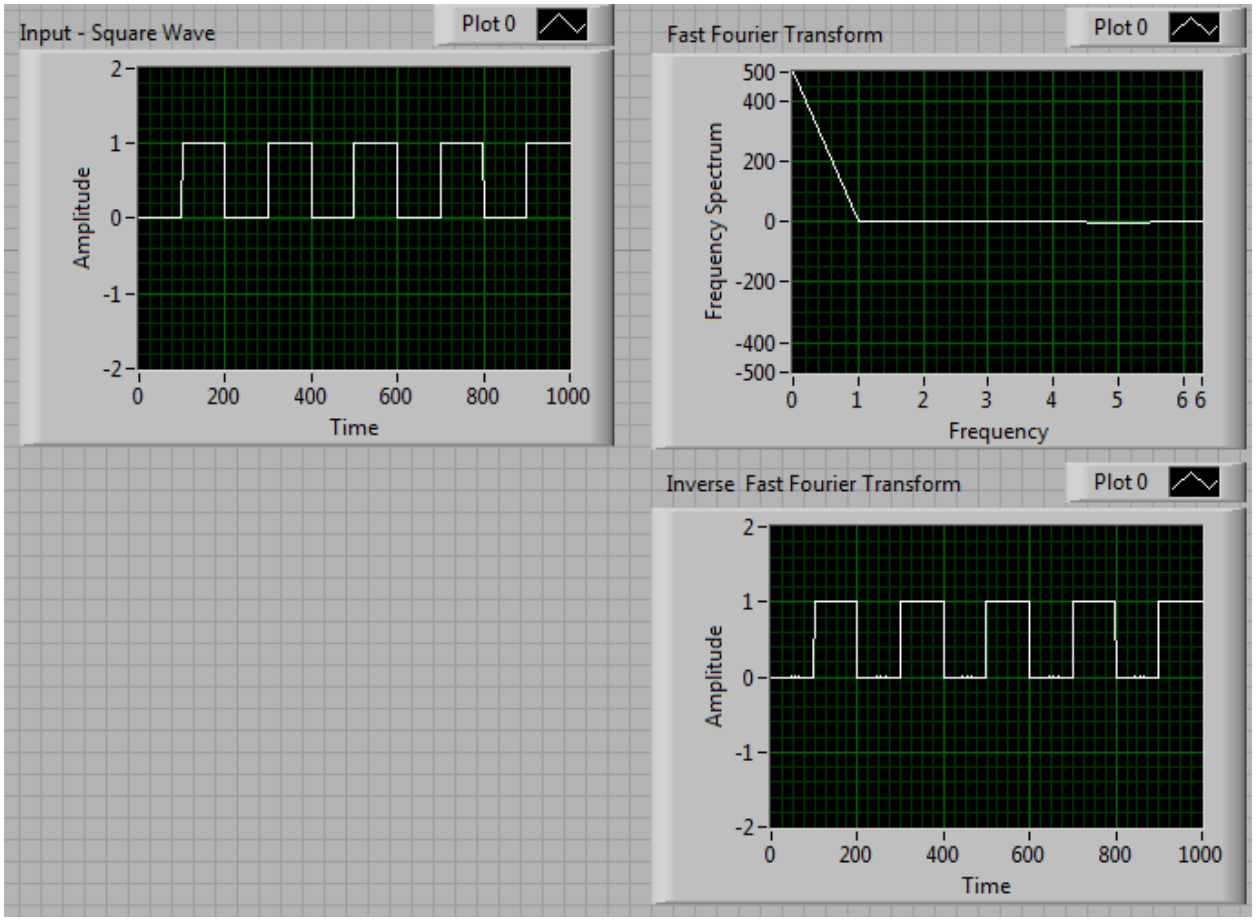

Figure 7