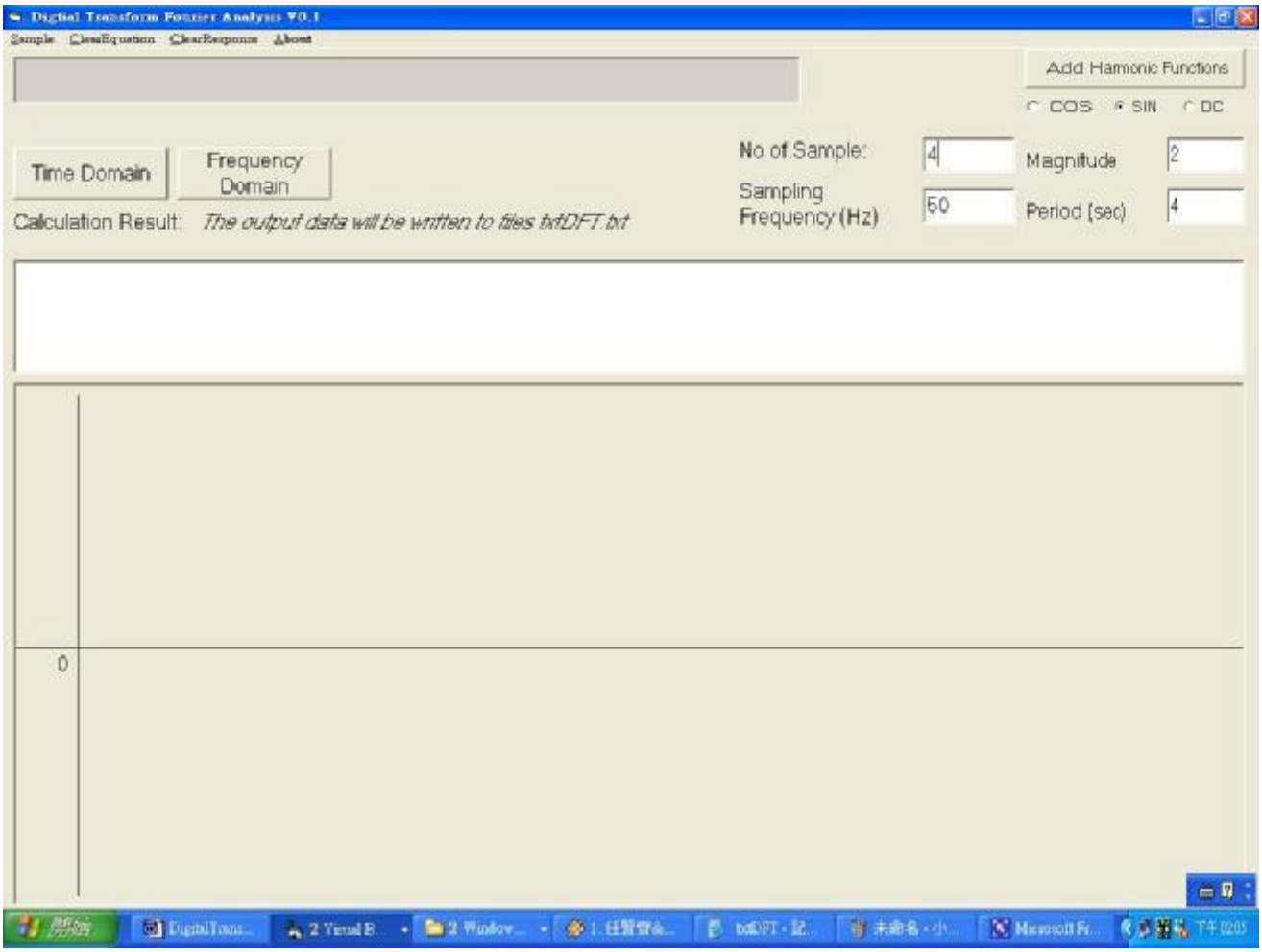
SOFTWARE DEMONSTRATION

In this section I will demonstrate the usage of the software DFT Analysis V0.1. That is software users can input some harmonic signal and then implement DFT transformation. By setting different sampling frequency, and the number of sample, the sampled data will be different, and therefore the DFT will also different.

Press the button "Time Domain" will draw the sampled signal in time domain. And press the button "Frequency Domain" will draw the DFT transformed signal in frequency domain.

User Interfacing

When the program starts the following interfacing will be appeared. Users can input some harmonic input signal for implementing the DFT analysis. Select the appropriate magnitude, and period for harmonic input, when input data is ok, press "Add Harmonic Functions", then the input signal will added and printed in text box at the top-right edge. When the input stream is completed, enter the number of sample and the sampling frequency for sampling the harmonic signal. Notice that by entering lower sampling frequency, aliasing effect will appear. After DFT calculation, time domain and frequency domain spectrum can be plotted. By pressing the buttons "Time Domain" and "Frequency Domain". All the input and output data will written to txt file txtDFT.txt that located in program directory, users can open it for reference or record.



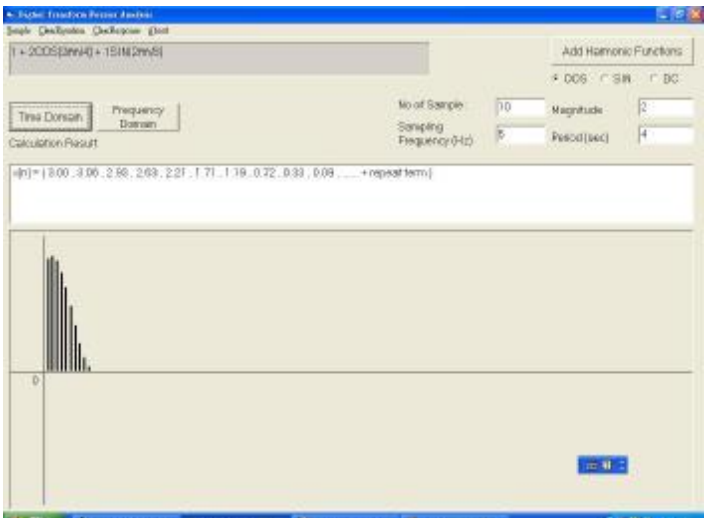
EXAMPLE 1: $1 + 2\text{COS}(2\pi n/4) + 1\text{SIN}(2\pi n/8)$

That is a sample equation of the DFT program. There is some samples equation for demonstrating the

DFT properties. In this example, the sampling frequency is 5Hz>>1/4 and >>1/8. Therefore there is no aliasing problem. Because the number of samples is ten in this case, the repetition cycle in frequency domain is also ten.

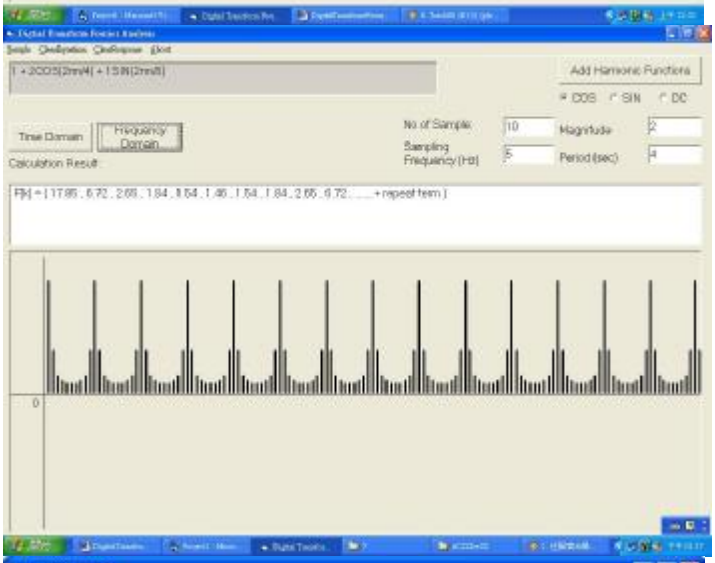
The Time domain spectrum. Press Time domain to plot the sampled signal in time domain. There are 10 samples.

x[n] = { 3.00 , 3.06 , 2.93 , 2.63 , 2.21 , 1.71 , 1.19 , 0.72 , 0.33 , 0.09 , ... + repeat term }

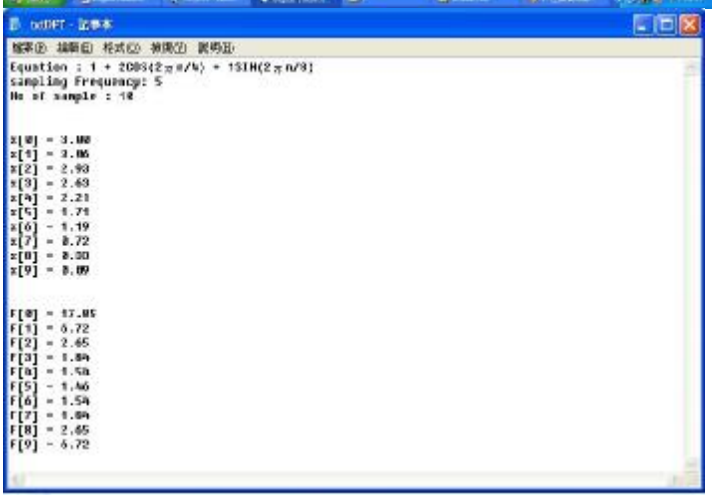


The frequency domain spectrum. Because the number of samples is ten in this case, the repetition cycle in frequency domain is also ten.

F[k] = { 17.85 , 6.72 , 2.65 , 1.84 , 1.54 , 1.46 , 1.54 , 1.84 , 2.65 , 6.72 , ... + repeat term }



When implement the DFT, the sampled input signal and the corresponding DFT transformed signal will be written to the txtDFT.txt file that located in the program directory. Therefore user can record or have a view of the output data.



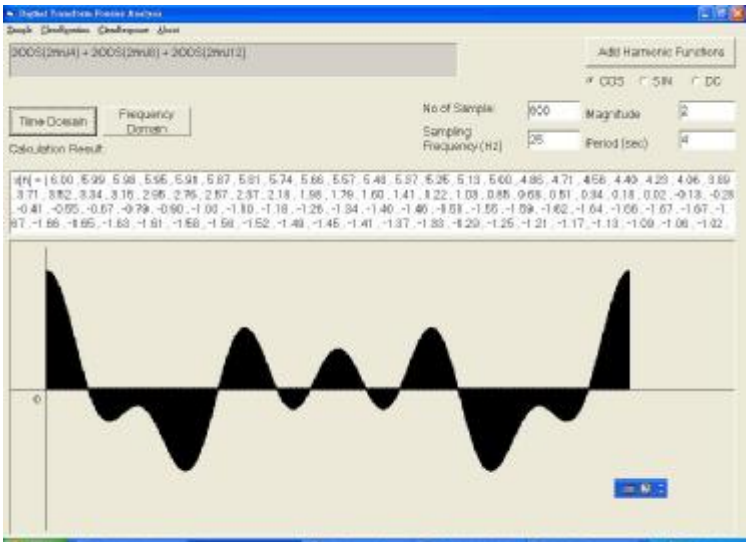
EXAMPLE 2: 2COS(2πn/4) + 2COS(2πn/8) + 2COS(2πn/12)

That is a sample equation of the DFT program. There is some samples equation for demonstrating the DFT properties. In this example, the sampling frequency is 25Hz>>1/8 and >>1/12. Therefore there is

no aliasing problem. Because the number of samples is 600 in this case, the repetition cycle in frequency domain is also 600.

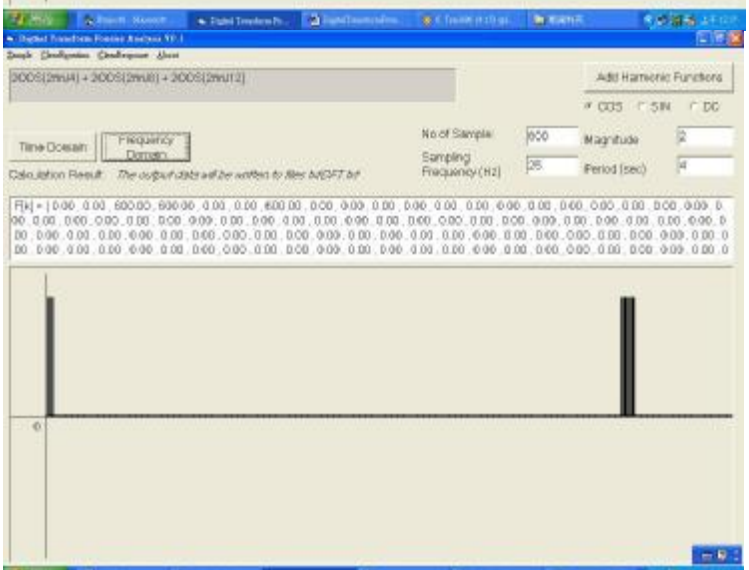
The Time domain spectrum. Press Time domain to plot the sampled signal in time domain. There are 600 samples.

x[n] = { 6.00 , 5.99 , 5.98 , 5.95 , 5.91 , 5.87 , 5.81 , 5.74 , 5.66 , 5.57 , 5.48 , 5.37 , 5.25 , 5.13 ……



The frequency domain spectrum. Because the number of samples is 600 in this case, the repetition cycle in frequency domain is also 600.

F[k] = { 0.00 , 0.00 , 600.00 , 600.00 , 0.00 , 0.00 , 600.00 , 0.00 , 0.00 , 0.00 , 0.00 ……



Similarly. The output data can be found in file txtDFT.txt.