

Digital Signal Processing Labwork Report

Tran Ngoc Hieu Nam BI10-124

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1.Signal

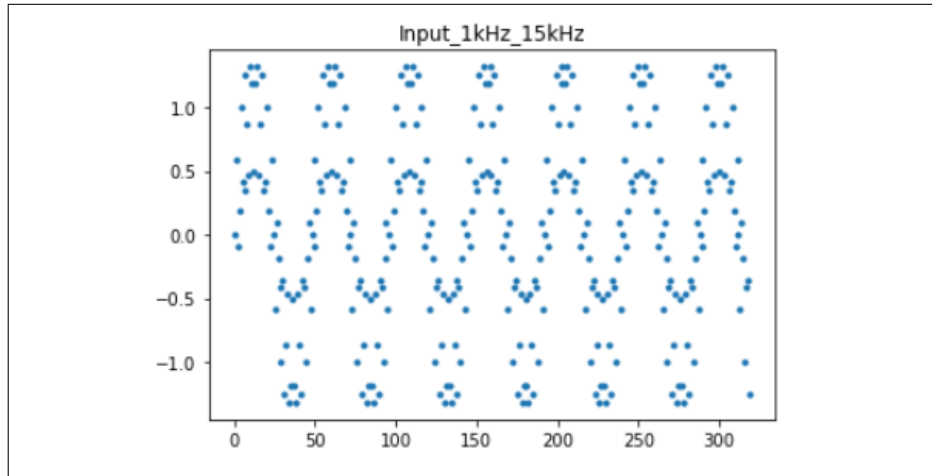


Figure 1: plot the signal in time domain

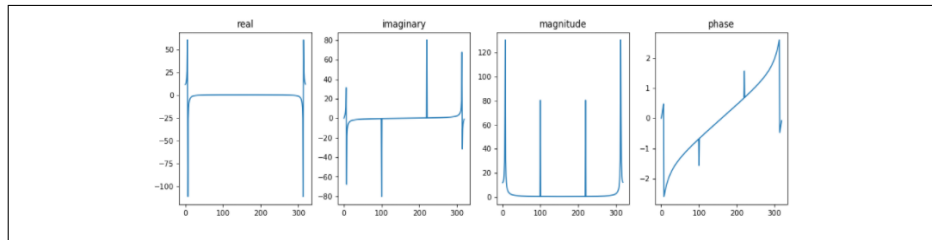


Figure 2: Fast Fourier-transform is used to convert this signal into frequency domain

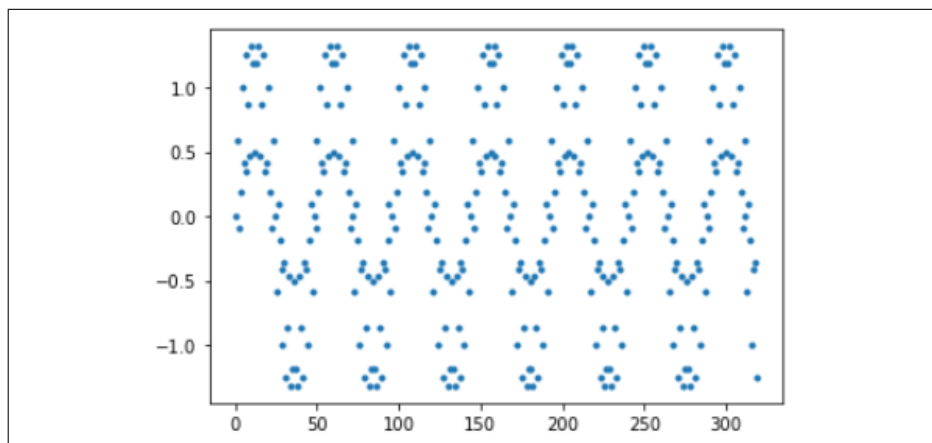


Figure 3: using Inverse-FFT to get back to time domain

Convert Input_1kHz_15kHz signal into frequency domain using fft
Convert Input_1kHz_15kHz signal back to time domain using ifft
The figure of this signal in time domain matches the figure of using ifft

2.System

2.1

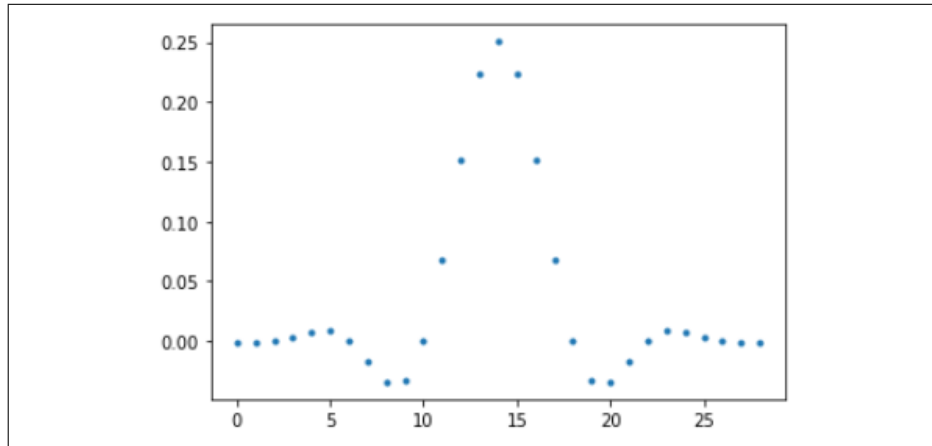


Figure 4: plot the Impulse response

2.2

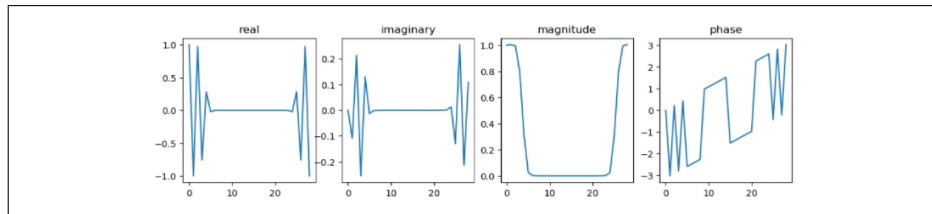


Figure 5: convert into frequency, plot real/imaginary/magnitude/phase

2.3

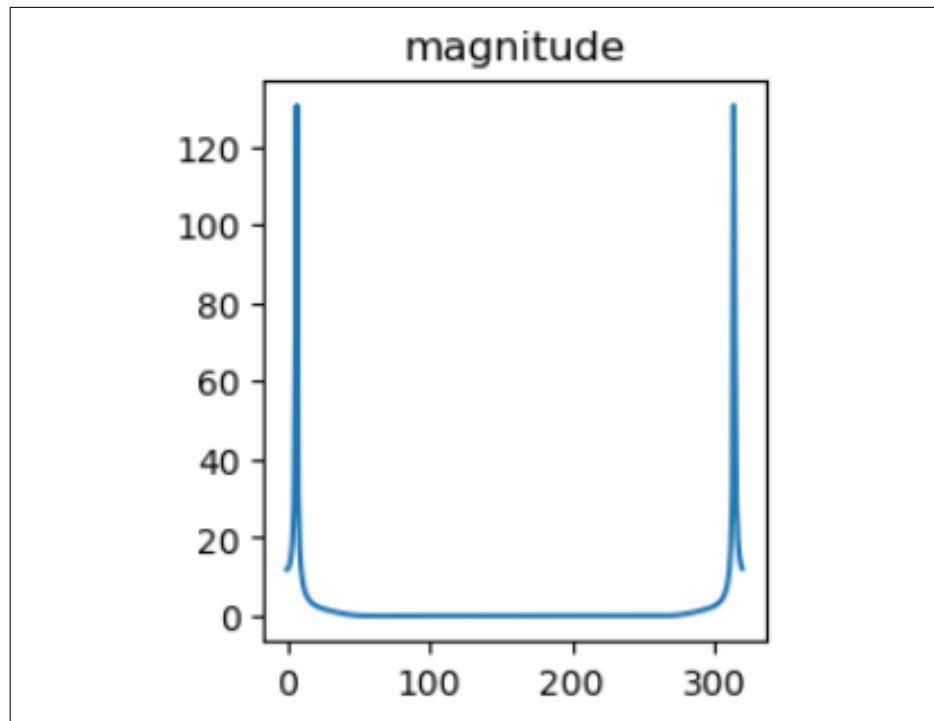


Figure 6: calculate the output using time convolution

2.4

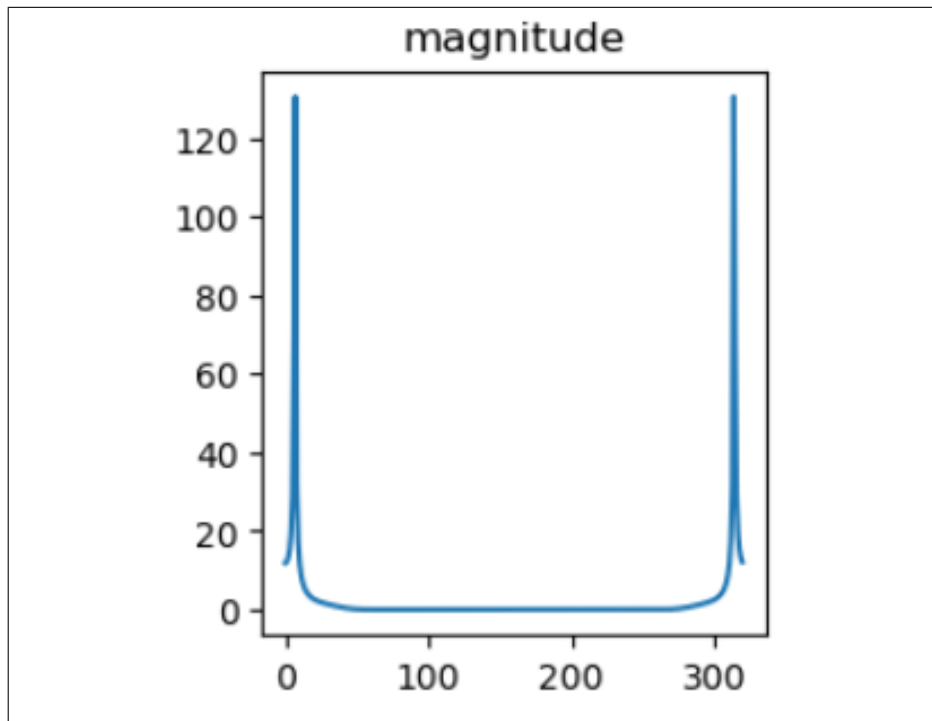


Figure 7: frequency multiplication

This part is tricky because the impulse response don't have the same shape as the input signal.

The process is that FFT of the output is equal to the multiplication of the 2 components of the convolution:

2.5 Comment: The magnitude of the output by using frequency multiplication and convolution must be the same