Fourier Techniques for Sound Visualization

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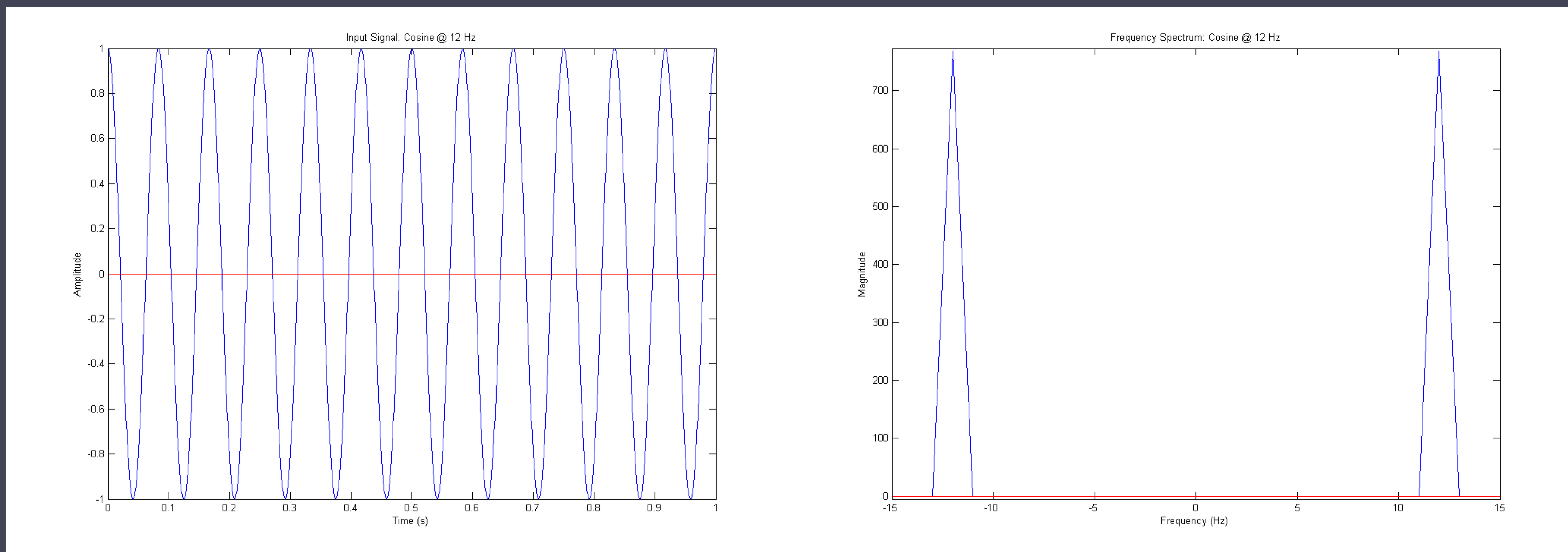
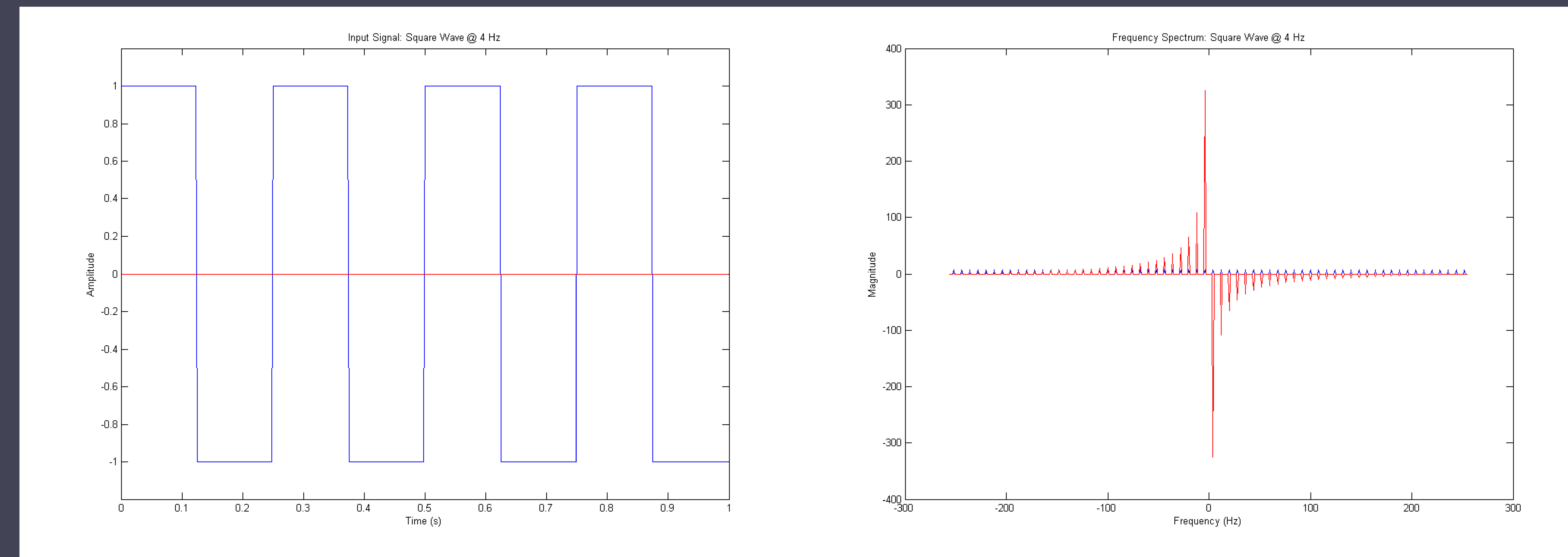
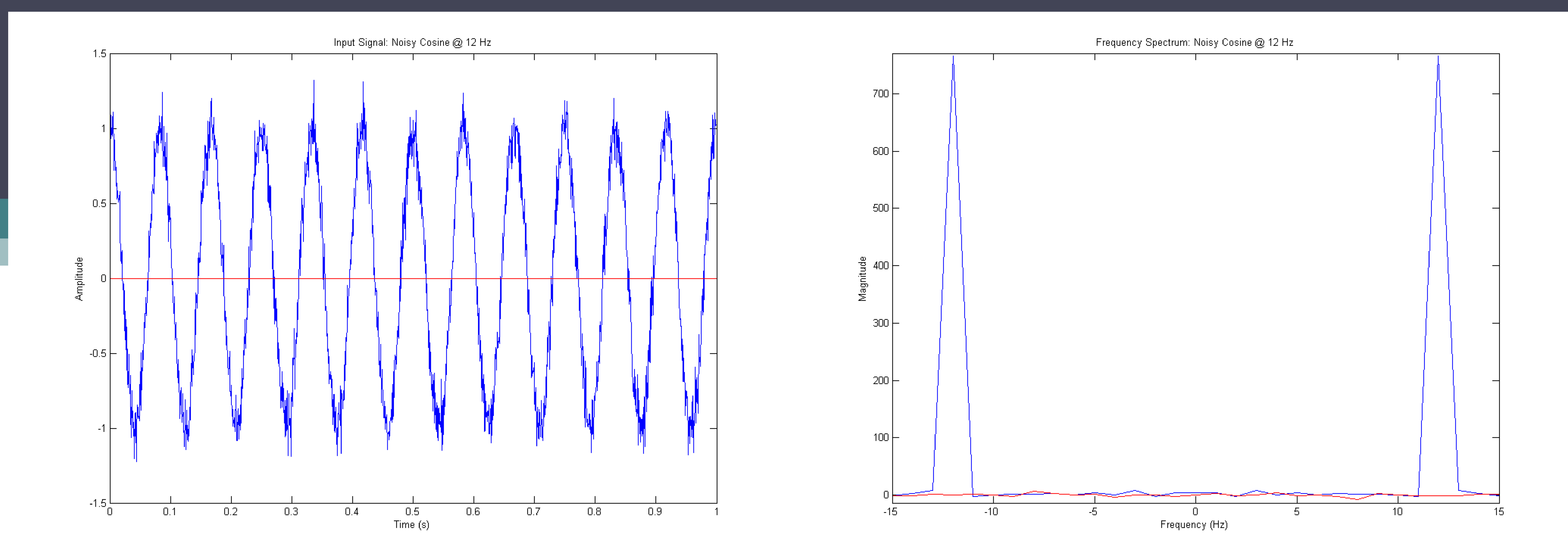
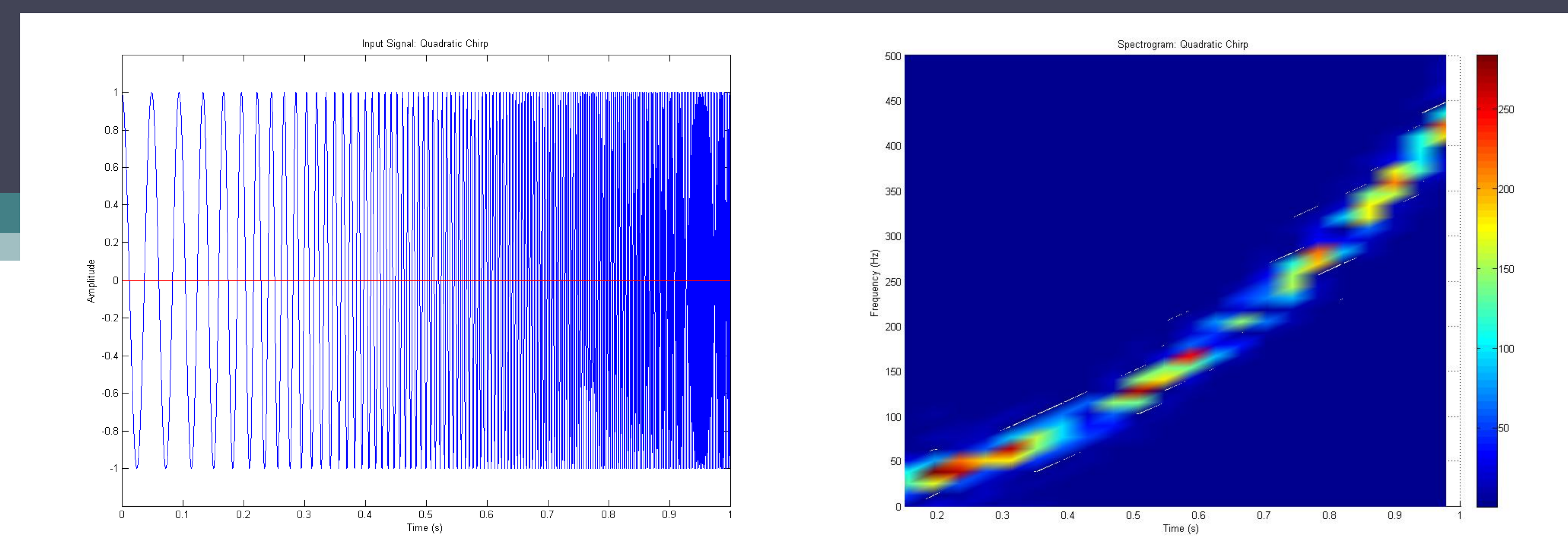




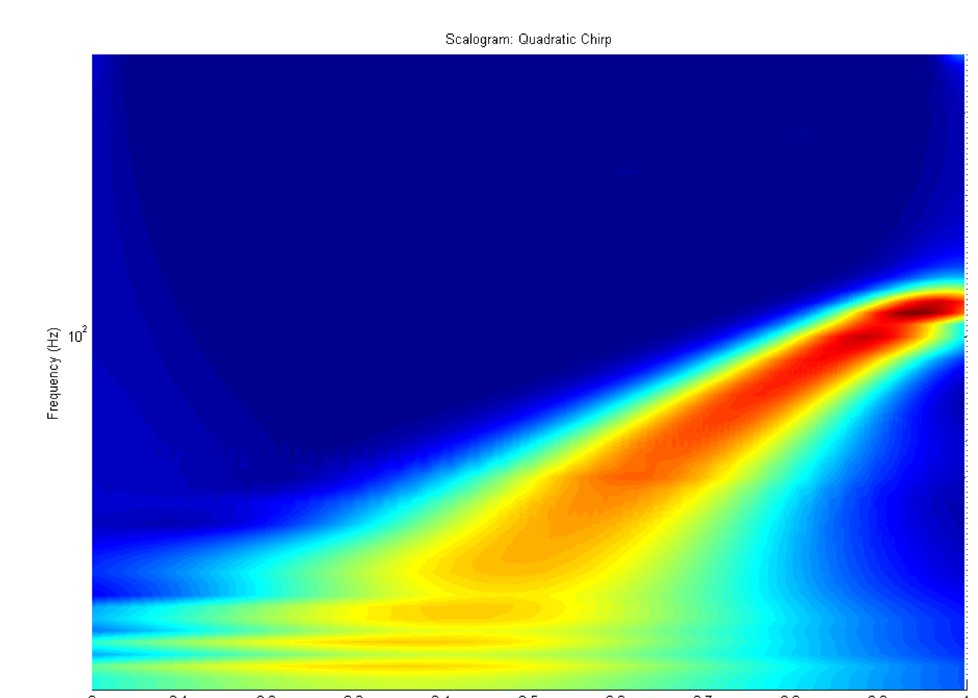
The Fourier Transform, and its discrete counterpart the Discrete Fourier Transform (DFT) each accept a signal function of time and output the frequency spectrum of the signal function. Shown are the frequency spectra of a single 12 Hz cosine wave and of a 4 Hz square wave.



Since the DFT is invertible, it can be used for noise removal, by transforming a signal, using window functions to remove undesired components, and inverting the transform.



Using a window function to localize small portions of the signal and then transforming, we can produce a plot of frequency against time, called a spectrogram. If we scale the window size with the frequency of the transform, we can plot it logarithmically. This is called a scalogram.



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