EECS 360 Signal and System Analysis

Lab 10. Sampling Frequency and Aliasing

Aliasing

When the sampling frequency is lower than the Nyquist rate, higher frequency components will overlap with lower frequency components, which causes signal distortion. This phenomenon is defined as *aliasing*. The following figure illustrates aliasing.

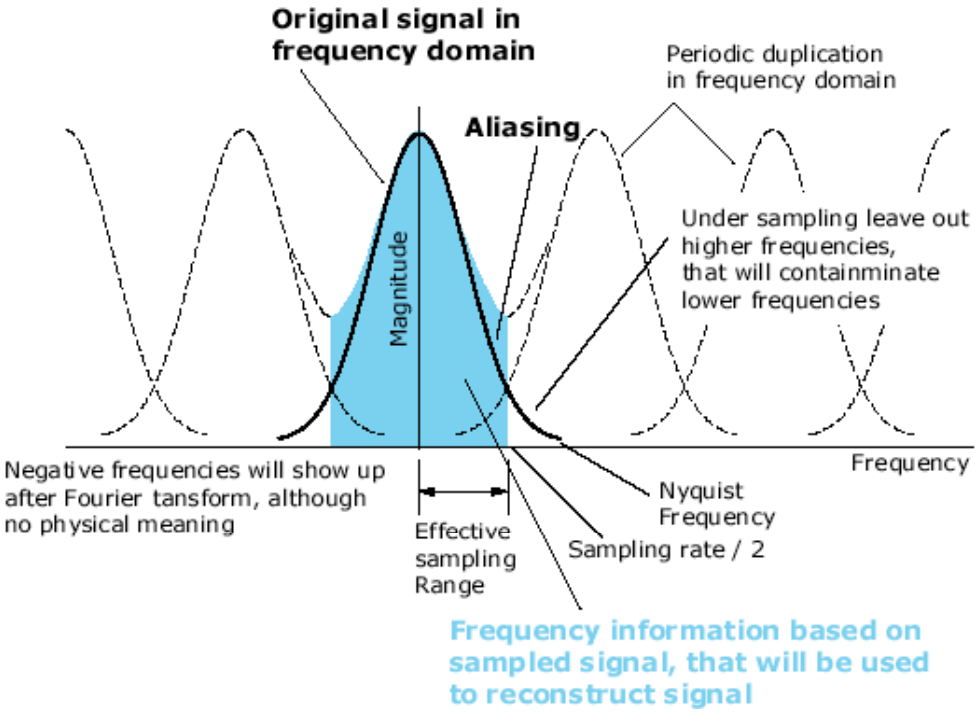

Fig. 1 Spectrum of Sampled Signal [1]

Consider a sinusoidal signal $x(t) = \cos(\omega_0 t)$ with period $T = 8$ seconds, sampled at four different rates: 1000 samples/s, 100 samples/s, 20 samples/s, and 10 samples/s, where $\omega_0 = 60 rad/\sec$.

(1). Plot the time domain signal at different sampling rates. (4 subplots)

(2). Find the Fourier transforms of the sinusoidal signal with various sampling rates, and graph them individually. (*Note: define frequency vectors properly for each signal.*)

(3). Discuss when aliasing, and what is the effect.