Tune-Up Tuesday for September 25, 2018

Write the MATLAB code for the following:

(a) Generate a chirp signal *x*[*n*] = cos( (0.7x10-4) *n2*) for *n* = 0, 1, …, 24000.

**n = 0 : 24000;**

**x = cos(pi\*(0.7\*10^(-4))\*(n.^2));**

(b) Plot the spectrogram *x*[*n*] with *fs* = 8000 Hz. See slide 4-12.

**fs = 8000;**

**blockSize = 1024; % Slide 4-12**

**shift = 512;**

**spectrogram(x, blockSize, shift, blockSize, fs, 'yaxis');**

(c) Play the audio signal using *fs* = 8000 Hz.

**soundsc(x, fs);**

**% In the spectrogram, the upward and downward slope of the triangle**

**% shape can be connected to sampling and aliasing. Initially, the sampling**

**% theorem is followed when the chirp has frequencies from 0 to fs/2,**

**% where fs = 8000, and the slope is upward. From fs/2 to fs, aliasing in the**

**% form of folding has occurred, and the slope is downward. From fs to 1.5 fs,**

**% aliasing not in the form of folding has occurred, and the slope is upward, etc.**

(d) Using MATLAB comments, describe what you hear.

**% The principal frequency of the sound increased from 0 to fs/2, then**

**% decreased from fs/2 to 0, then increased from 0 to fs/2, etc.**

This problem is from *Signal Processing First*, problem P-4.17, page 100.