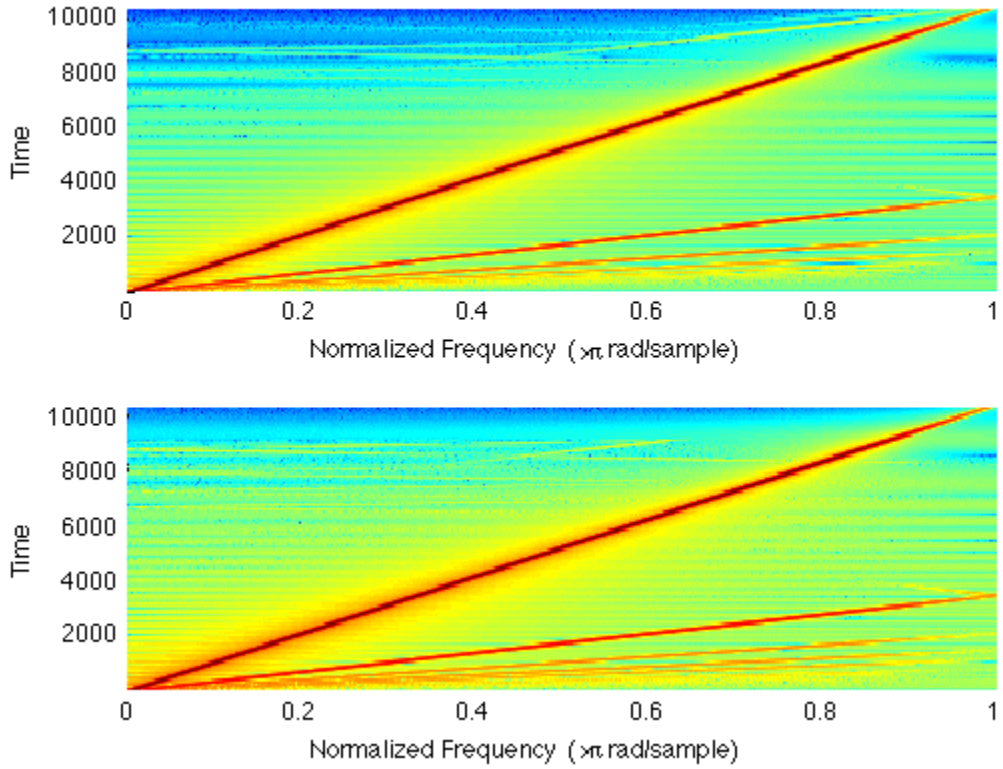
```
% question 1b

% try out the 3 kinds of filters

% [B_butter, A_butter] = butter(12,0.12);
[B_cheby, A_cheby] = cheby2(12,96,0.16);
% [B_ellip, A_ellip] = ellip(12,1/8);


% obtain SOS
% [co,g] = tf2sos(B_butter, A_butter);
[co,g] = tf2sos(B_cheby, A_cheby);

% better display function to copy paste directly to code
matrify(co)
disp(g)

% plot output
[x,fs] = wavread('sweep1bsoft.wav');
[y,fs] = wavread('sweep1bhard.wav');

subplot(2,1,1), spectrogram(x(:,1),1024);
subplot(2,1,2), spectrogram(y(:,1),1024);

%the aliasing is a lot more when a hard clip is used as compared to a soft
%clip because the presence of a hard corner adds infinite bandwidth to the
%signal and hence a lot more of the frequencies above nyquist gain
%amplitude and flip around to alias

% aside from the aliasing the hard clip produces a 'brighter' tone as the
% higher frequencies have more energy than the comparable soft clipped
% signal


{1.0000000000000000,1.1785487532710102,0.9999999999999919,-1.2757184904151924,0.40
{1.0000000000000000,-0.7583238192403949,1.0000000000000502,-1.3457584572238965,0.4
{1.0000000000000000,-1.3959068220445356,0.9999999999984834,-1.4588611015844655,0.5
{1.0000000000000000,-1.6207641789064129,1.0000000000105453,-1.5852516436785695,0.6
{1.0000000000000000,-1.7132116937049666,0.9999999999764242,-1.7090403183235447,0.8
{1.0000000000000000,-1.7485950542998536,1.0000000000145233,-1.8285375590278772,0.9
     4.095208812873113e-05
```



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