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%%%

Testbench for eq/shelving+notch filters

For frequency and impulse response analysis and

by Preben Thorød - Gr 6 DAT096 - HandyEq - Chalmers University of Technology Using shelving() function by Jeff Tackett 08/22/05, Based on DAFX book and Zölner calculations and formulas for biquad filters.

%%%

0225 TODO: for multiple:

Freqz not fixed, Way to plot total transferfunction, simplified multiple transferfunction (just max/min/neutral)

..later: Split coeffisient generation from plot functions (make actual functions?)

Testbench options

```
N = 1024;       %fft window size for freq analysis
single = 0;     % Single(1) or multiple filter curves
bodegen = 1;    % Bodeplot(1) or freqz (0)
FreqScale = 'log'; %'linear' or 'log'
```

System parameters

```
Fs = 41000;     %Hz
Fsw = Fs*2*pi;  %sample rate rad/s
```

```
Ts=1/Fs;
```

Filter specification input parameters

Treble shelving filter

```
%NB: Uneven number of filter coefficient is not handled yet!!!
fcTreb = 4500;       % Cutoff frequency
GsTreb = 12;        % Single coeffisient set, gain in dB
GmTreb = [-12 -9 -6 -3 0 3 6 9 12];  % Coeffisient vector, multiple gain level
QTreb = 1.0;                % Q-factor
typeTreb = 'Treble_Shelf';      % 'Base_Shelf' or 'Treble_Shelf'
```

Bass shelving filter

```
fcBass = 500;       % Cutoff frequency
GsBass = 12;        % Single coeffisient set, gain in dB
GmBass = [-12 -9 -6 -3 0 3 6 9 12];  % Coeffisient vector, multiple gain level
QBass = 0.8;                % Q-factor
typeBass = 'Base_Shelf';      % 'Base_Shelf' or 'Treble_Shelf'
```

SINGLE COEFFISIENT SET

```
if single == 1
```

Generate filter coefficient

```
    [BTreb,ATreb] = shelving(GsTreb, fcTreb, Fs, QTreb, typeTreb);
    [BBass,ABass] = shelving(GsBass, fcBass, Fs, QBass, typeBass);
```

Generate plot

```
if bodegen ==1
    %bodeplot
    tfdBass = tf(ABass,BBass,Ts)   %Discrete transfer function
    tfdTreb = tf(ATreb,BTreb,Ts)   %Discrete transfer function
    tfdTot = series(tfdBass,tfdTreb)
    hbode = bodeplot(tfdTot);
    setoptions(hbode,'FreqUnits', 'Hz','FreqScale', FreqScale, 'Xlim',[10 Fs/2
else
    %freqz plot
    freqz(a,b,N,Fs);
end
```

MULTIPLE COEFFISIENT SET

```
else
```

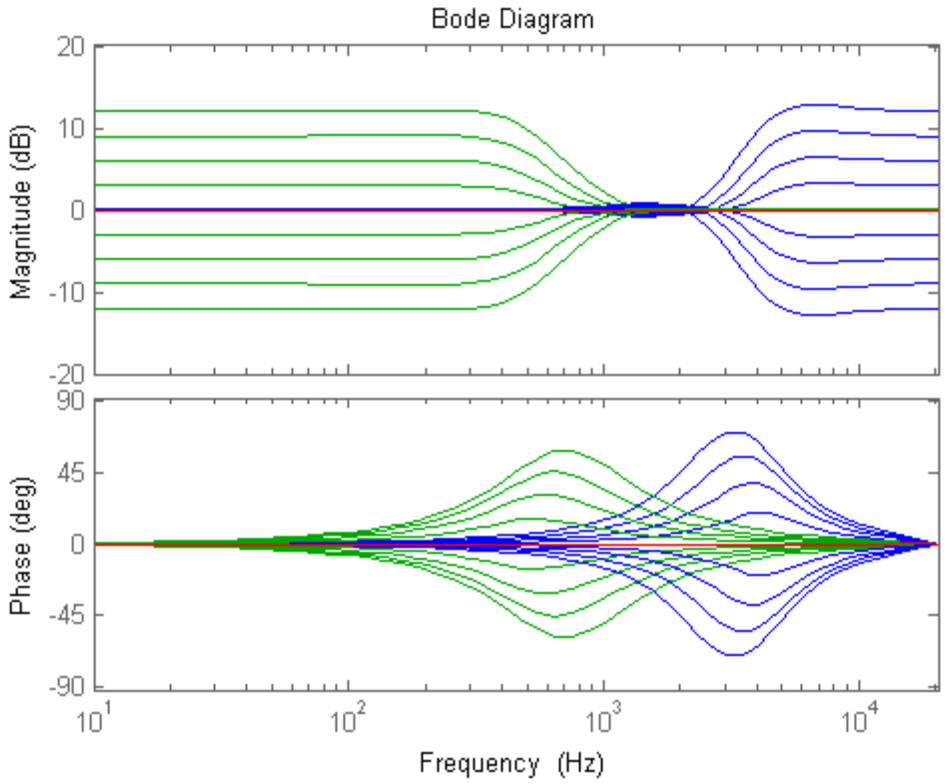
```
        ATreb = cell(1,length(GmTreb));
        BTreb = cell(1,length(GmTreb));
        ABass = cell(1,length(GmBass));
        BBass = cell(1,length(GmBass));
        HTreb = cell(1,length(GmTreb));
        HBass = cell(1,length(GmBass));
        tfdTreb = cell(1,length(GmTreb));
        tfdBass = cell(1,length(GmBass));
        GmTotLength = max([length(GmBass) length(GmTreb)])
        tftTot = cell(1,GmTotLength);
        if bodegen == 1
            %bodeplot
            for i = 1:GmTotLength %!!!!!!!!!!!!!!!!!!!
                % Generate coefficients
                [BTreb{i}, ATreb{i}] = shelving(GmTreb(i), fcTreb, Fs, QTreb, 'Treble_
                [BBass{i}, ABass{i}] = shelving(GmBass(i), fcBass, Fs, QBass, 'Base_Sh
                tfdTreb{i} = tf(ATreb{i},BTreb{i},Ts);
                tfdBass{i} = tf(ABass{i},BBass{i},Ts);
                hold on;
                % test: treble plot
                hbodeTreb = bodeplot(tfdTreb{i},'b');
                % test: treble plot
                hbodeBass = bodeplot(tfdBass{i},'g');
            end
            setoptions(hbodeBass,'FreqUnits', 'Hz','FreqScale', FreqScale, 'Xlim',[10

            % TEST, neutral position:
            tfdNull = series(tfdBass{5},tfdTreb{5}); % Not dynamic!!!!!
            hnull = bodeplot(tfdNull, 'r');

        else
            %freqz plot
            for i = 1:length(Gm)
                % Generate coefficient vector
                [B{i}, A{i}] = shelving(Gm(i), fc, Fs, Q, 'Base_Shelf');
                hold on;
                freqz(A{i},B{i},N,Fs);
            end
        end
    end


        GmTotLength =

             9
```



Output and save plot

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