Inverse Chebyshev filter - lowpass and highpass case

An inverse Chebyshev filter, also known as the Type II Chebyshev filter type, is less common because it does not roll off as fast as Type I and requires more components. It has no ripple in the passband, but does have equiripple in the stopband. In the following example we show how Chebyshev type II filter can be designed for all four major types of filters. First, we start with a low pass filter of order 4, stopband ripple of 60dB, with stopband edge at 0.5Hz and sampling frequency at 2Hz.

CFIIlo := cheby2lohi(4 , "low" , 0.5 , 60 , 2) Chebyshev type II design

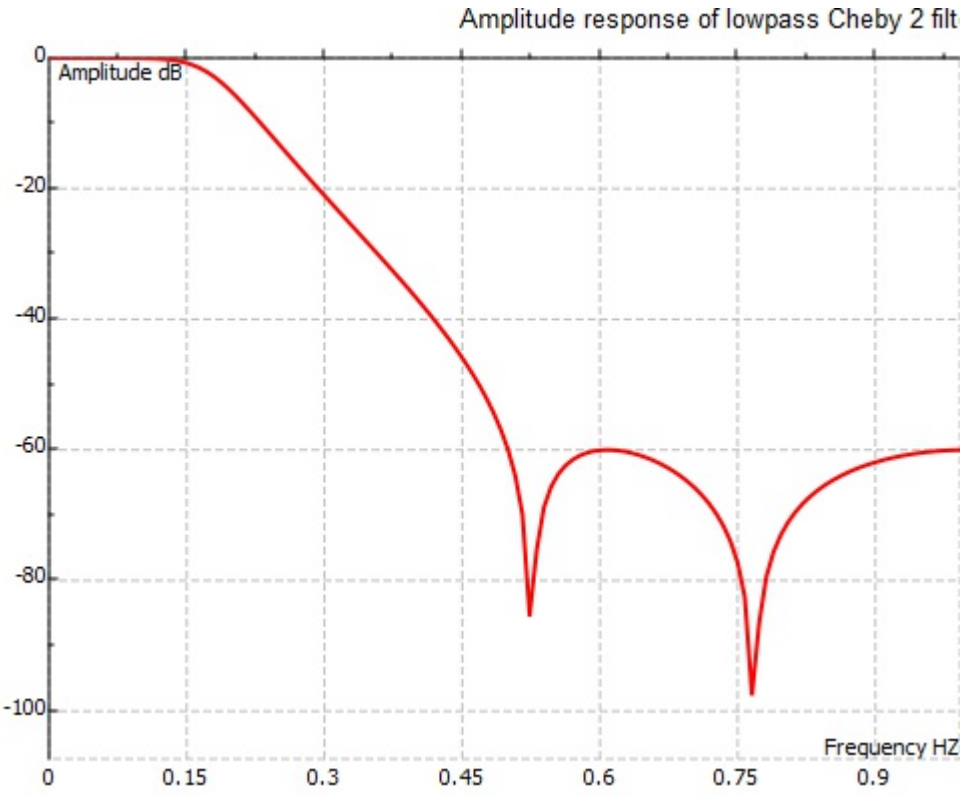
A1 := col2vec(CFIIlo , 1) Denominiator coefficients

B1 := col2vec(CFIIlo , 0) Numerator coefficients

Flo := iirfreqres(A1 , B1 , 128 , 1) Frequency response of the filter

fre := ynodes(z , 0 , 1 - 1 / 128 , 128) Frequency axis

Flog := join mat cols(fre , 20 log10(fabs(Flo))) Graph of the amplitude response



Highpass case

Next, we design a high pass filter of order 4, stopband ripple of 60dB, with stopband edge at 500Hz and sampling frequency at 2000Hz.

CFIIhi := cheby2lohi(4 , "high" , 500 , 60 , 2000)

A2 := col2vec(CFIIhi , 1)

$B2 := \text{col2vec}(CFIIhi, 0)$

$Fhi := \text{iirfreqres}(A2, B2, 128, 1)$

$Fhig := \text{join mat cols}\left(1000\ fre, 20\ \log10\left(\text{fabs}(Fhi)\right)\right)$