# *Elliptic filter - lowpass and highpass case*

Elliptic filter is a very useful IIR filter. It has a equiripple magnitude response in both passband and stopband. In the following example we show how Elliptic filters can be designed for all four major types of filters. First, we start with a low pass filter of order 4, with passband edge at 0.5Hz, passband ripple at 1dB, stopband attenuation at 60 and sampling frequency at 2Hz.

Elliplo := elliplohi(4 , "low" , 0.5 , 1 , 60 , 2)   Design of low-pass filter

A1 := col2vec(Elliplo , 1)   Denominator coefficients

B1 := col2vec(Elliplo , 0)   Numerator coefficients

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

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

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

Amplitude response of elliptic low-pass filte
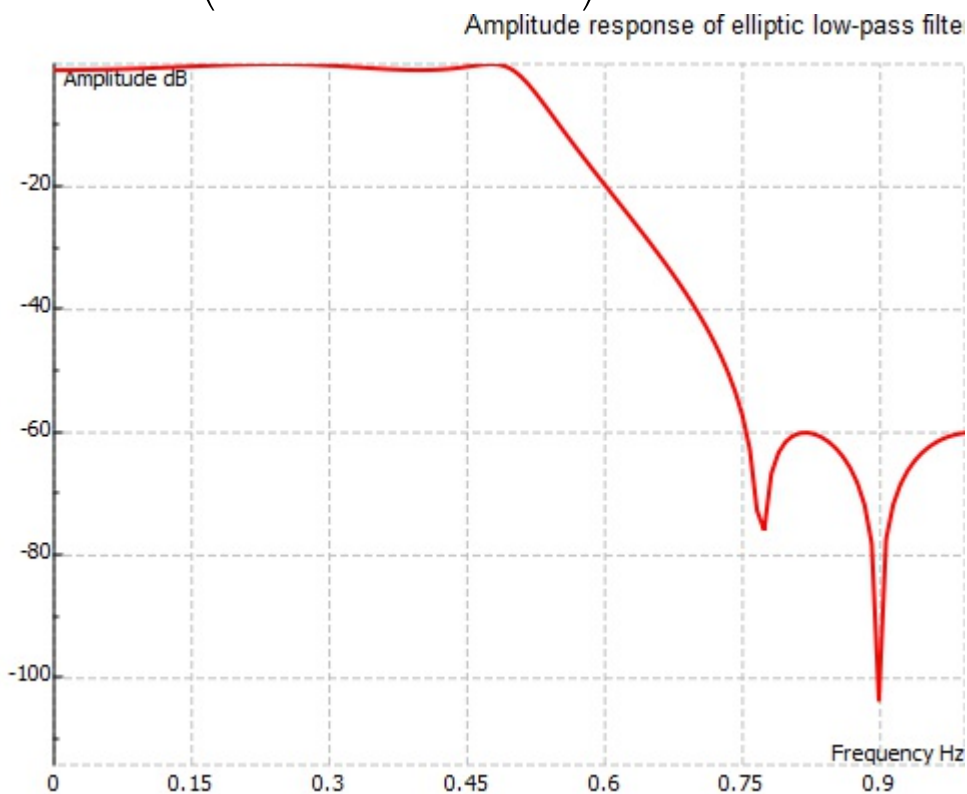
High-pass filter

Next, we design a high pass filter of order 4, with passband edge at 500Hz, passband ripple at 1dB, stopband attenuation at 60 dB and sampling frequency at 2000Hz

Elliphi := elliplohi(4 , "high" , 500 , 1 , 60 , 2000)   Filter design

A2 := col2vec(Elliphi , 1)

B2 := col2vec(Elliphi , 0)

Fhi := iirfreqres(A2 , B2 , 128 , 1)

Flhi := join mat cols(fre , 20 log10(fabs(Fhi)))   Amplitude response of high-pass elliptic filter

Amplitude response of high-pass elliptic filte

Amplitude dB

-20

-40

-60

-80

-100

0   0.15   0.3   0.45   0.6   0.75   0.9

Frequency Hz