

DSP EEE F434: Practical 7

Filter Design



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Task 1: FIR Filter Design

Task 1 needs to be completed.

- 1 Design first order FIR filters (low pass, high pass, bandpass, and bandstop). Plot the frequency response, phase response, and impulse response. Use Matlab functions `fir1`, `freqz`, and `impz`.
- 2 Repeat the above by increasing the order of filter. Plot response in the same figure and observe the effect of order of filter.
- 3 Consider impulse response (length less than 10) of linear filters with symmetry/antisymmetry. Confirm the design criteria of Type1, Type2, Type3, and Type4 FIR filters.
- 4 Design FIR filters (low pass, high pass, bandpass, and bandstop) with linear phase of any order.
- 5 Design a low pass FIR filter with non-linear phase by avoiding the symmetry condition.

Task 2: IIR Filter Design

- 1 Find the frequency response of first order IIR digital filters.
- 2 Compare the magnitude and phase response with FIR filters.
- 3 Design a second order IIR bandpass filter with center frequency 0.4π and 3-dB bandwidth of 0.1π . Use Matlab function `iirpeak`.
- 4 Design a second order IIR bandstop filter with center frequency 0.4π and 3-dB bandwidth of 0.1π . Use Matlab function `iirnotch`.
- 5 Design a comb filter with a 3-dB bandwidth of 0.2π . Use Matlab function `iircomb`.