



Indian Institute of Information Technology Design and Manufacturing - Kancheepuram

Advanced DSP Practice

Experiment 5: Comb Filters

Due Date: 01-Mar-18
Faculty: R. Neelakandan

Total Marks: 10
Evaluation: Individual

1 Objective

The objectives of the experiment are:

- Concept of comb filters and its applications.
- Design of FIR and IIR comb filters.

2 FIR Comb Filters

Consider FIR filters with transfer function $H(z) = \frac{1}{2}(1 + z^{-1})$ and $G(z) = H(z^L)$. Assume $L = 3$.

- Sketch the impulse response and frequency response of the filters.
- What is the role of L in the response of $G(z)$?
- Identify the relation between the impulse responses $h[n]$ and $g[n]$.

Repeat the above simulation for $H(z) = \frac{1-z^{-M}}{M(1-z^{-1})}$.

3 IIR Comb Filters

Consider the IIR low pass filter

$$H(z) = K \frac{1 - z^{-1}}{1 - \alpha z^{-1}}$$

where $\alpha = 0.5$.

- Determine the value of K to set the maximum gain of the filter is 0dB.
- Plot the impulse response and frequency response of the filter.
- Plot the impulse response and frequency response of the filter $G(z) = H(z^2)$.