

Quiz 9
March 21, 2005

You are given a comb filter $H_C(z) = (1-z^{-N})/N$, with $N=6$. By using the pole-zero cancellation technique (i.e., comb + resonator cascade), design a high-pass filter with a max gain of 10. Provide:

- a) a z-transform expression for the cascade
- b) an approximate plot of the filter magnitude response, specifying at the very least the zeros, peaks, and the expected cutoff (-3dB) frequency.

a) high-pass filter \Rightarrow want $k = 3$

$$H(z) = \frac{1-z^{-6}}{6} \cdot \frac{\textcircled{10} \rightarrow \text{max gain}}{1 - e^{j2\pi 3/6} z^{-1}} = \frac{1-z^{-6}}{3} \cdot \frac{5}{1+z^{-1}}$$

b) Magnitude responses:

