8.33 Use the GUI module *g_iir* to design a Chebyshev-II bandstop filter. Find the smallest order filter that meets or exceeds the following design specifications.

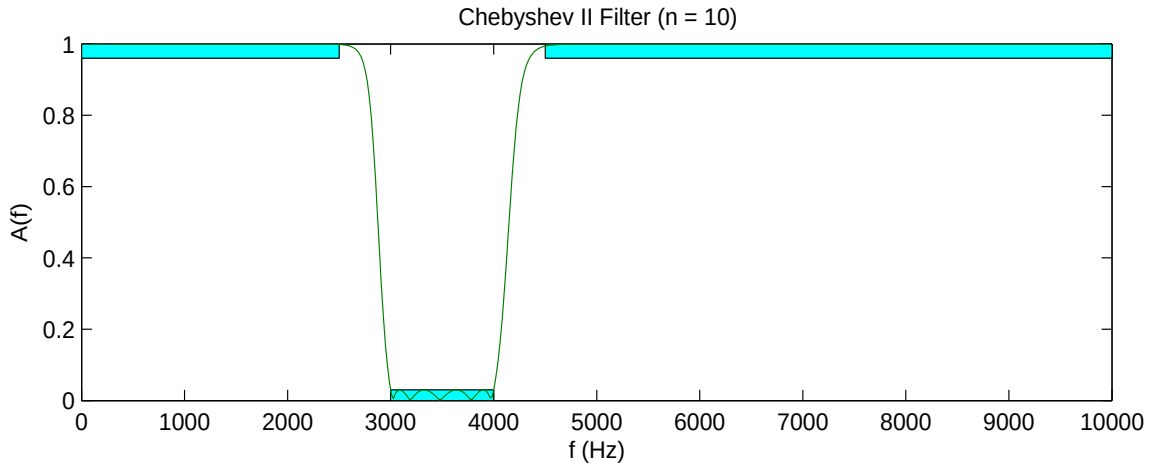
$$\begin{aligned}(f_s, F_{p1}, F_{s1}, F_{s2}, F_{p2}) &= (20000, 2500, 3000, 4000, 4500) \text{ Hz} \\ (\delta_p, \delta_s) &= (0.04, 0.03)\end{aligned}$$

(a) Plot the magnitude response.

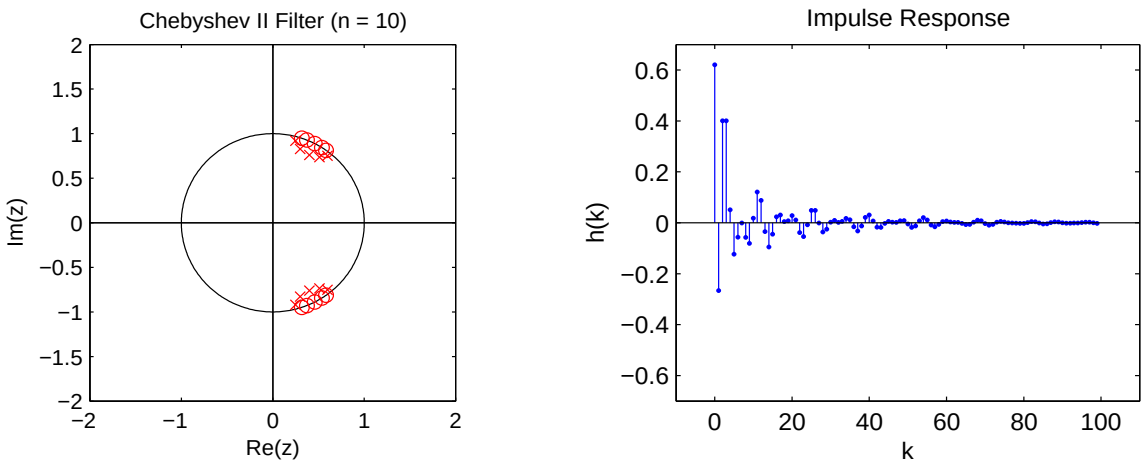
(b) Plot the pole-zero pattern.

(c) Save a, b, and fs in a MAT-file named *prob8_30*. Then use GUI module *g_filters* to load this as a user-defined filter. Adjust the number of bits used for coefficient quantization to a level that shows a significant difference between the quantized and unquantized linear magnitude responses. Plot the magnitude responses.

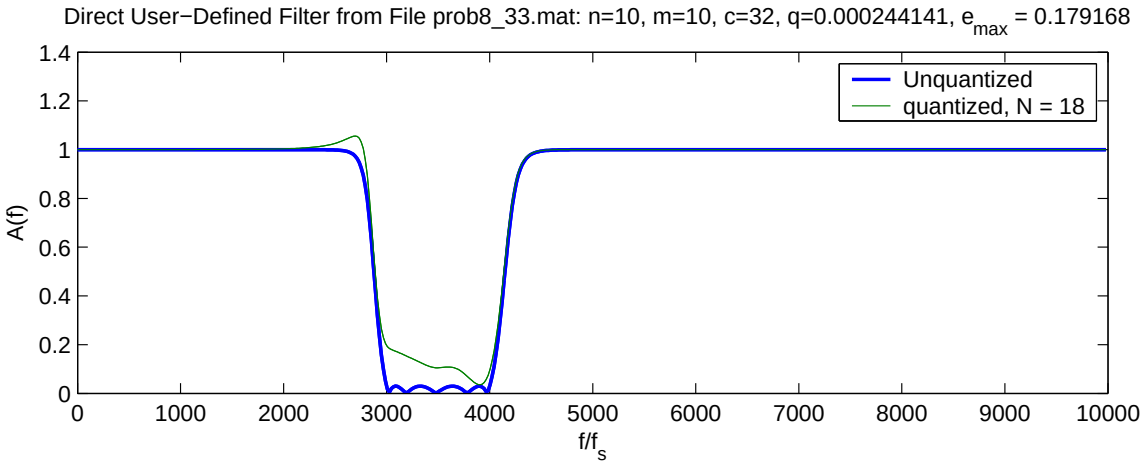
Solution



(a) Chebyshev-II Bandstop Magnitude Response



(b) Chebyshev-II Bandstop Pole-Zero Plot



(c) Chebyshev-II Magnitude Response with Coefficient Quantization