

# E4215: Analog Filter Synthesis and Design: HW9

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Design and simulate the following active versions of the Inverse Chebyshev filter (scaled to a 2 MHz pass-band) given in HW8. Start with all resistors of  $10\text{ k}\Omega$  or all  $g_m$  of  $100\ \mu\text{S}$ .

Scale the circuit to have equal maxima in the ac response of all opamp/ $g_m$  outputs. Submit the schematic with all the component values and the magnitude response plots before and after scaling. Plot the output magnitudes of all the outputs in a given filter on the same plot.

1. (10 pts.) Cascade of opamp-RC biquad stages—zeros using feedforward.
2. (10 pts.)  $g_m$ -C ladder filter.

Table 1: Inverse chebyshev prototype zeros and poles: passband corner = 1 rad/s

Inverse Chebyshev			
zeros	poles	pole resonant frequency	pole quality factor
$\pm j3.0671$	$-0.2811 \pm j1.1013$	1.1366	2.0218
$\pm j1.8956$	$-0.9461 \pm j0.8751$	1.2887	1.4202
	-1.4202	n/a	n/a

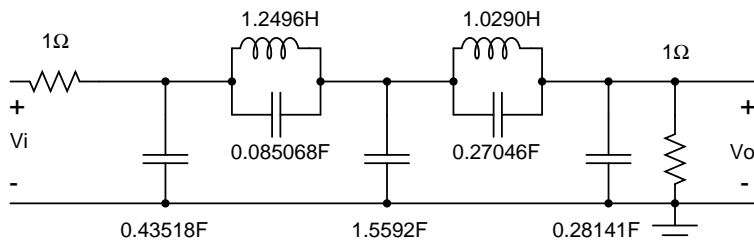


Figure 1: Inverse chebyshev doubly terminated ladder prototype with poles and zeros shown in Table 1