Spring 2004; E4215: Analog Filter Synthesis and Design; HW4

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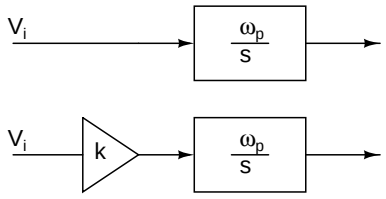

Figure 1:

1. Calculate V_o/V_i of the two circuits shown in Fig. 1. Sketch the magnitude response of the two, overlaid on the same axes. What is the effect of the gain on the integrator?

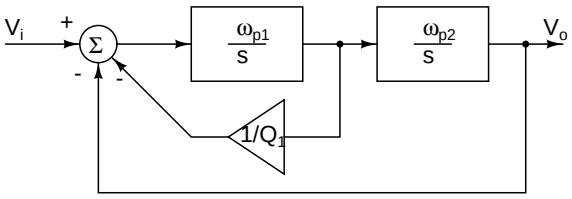

Figure 2:

2. Calculate V_o/V_i of the filter in Fig. 2. Calculate the quality factor Q and the resonant frequency ω_p of the filter.

3. Design a second order passive lowpass RLC notch filter with $Q = 1/\sqrt{2}$, $\omega_p = 2\pi \times 1\,\text{MHz}$ and a transmission zero at $\omega_z = 2\pi \times 10\,\text{MHz}$. Use the topology in Fig. 3 with $C_1 + C_2 = 1\,\text{nF}$.

4. Calculate the transfer functions from inputs $\{V_{i1,gm},\ V_{i1,C},\ V_{i2,gm},\ V_{i2,C}\}$ to the outputs $\{V_1, V_2\}$. When calculating the effect of one input, set all other inputs to zero. Generate a table similar to the one given in the handout "Transfer functions realizable in a biquad".

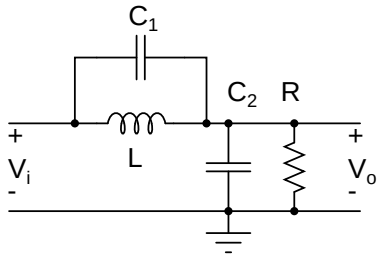

Figure 3:

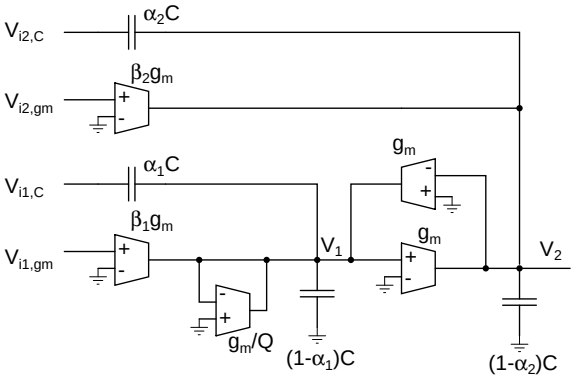

Figure 4: