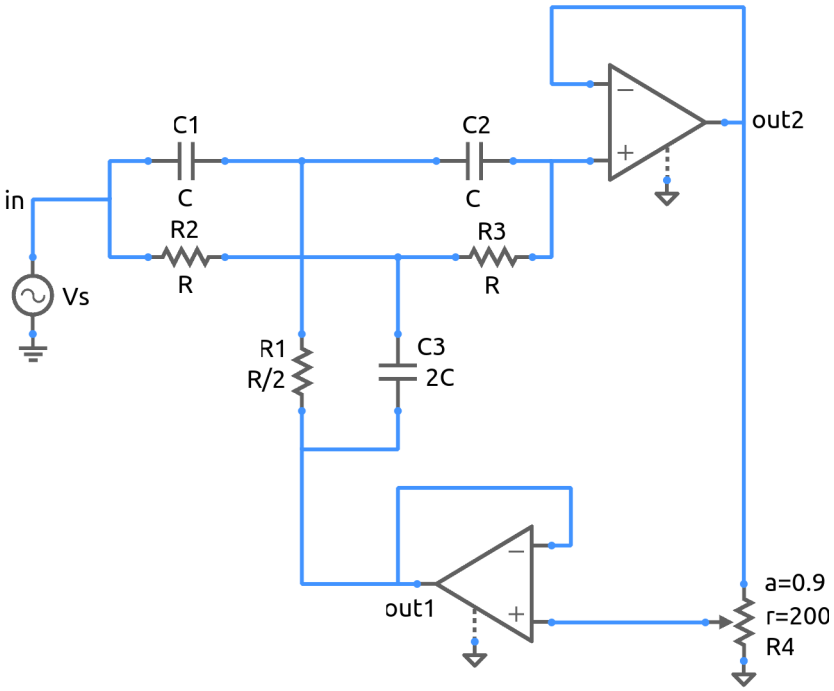
notch_filter.sqproj



A "Twin T" notch filter is shown in the figure. The transfer function (with output taken at the node `out2`) is given by

$$H(s) = \frac{V_o(s)}{V_s(s)} = \frac{s^2 + \omega_0^2}{s^2 + (4\omega_0 a)s + \omega_0^2}\,, \tag{1}$$

where $\omega_0 = 1/RC$, and a denotes the pot resistance fraction. Since the numerator becomes zero at $\omega = \omega_0$, we get a "notch" in the filter transfer function at ω_0. Note that, for $\omega \gg \omega_0$ and $\omega \ll \omega_0$, $|H(s)|$ approaches 1. By changing the pot fraction a, the quality factor of the filter can be changed.

Exercise Set

1. Run the simulation. Plot V_{out2} versus frequency (log-log plot), and verify the notch filter functionality.

2. If R is doubled, how would the filter response change? Verify with simulation.

3. Repeat for different values of a (the pot setting) and observe the effect on the filter response.

References

1. http://www.radio-electronics.com/info/circuits/opamp_notch_filter/opamp_notch_filter.php