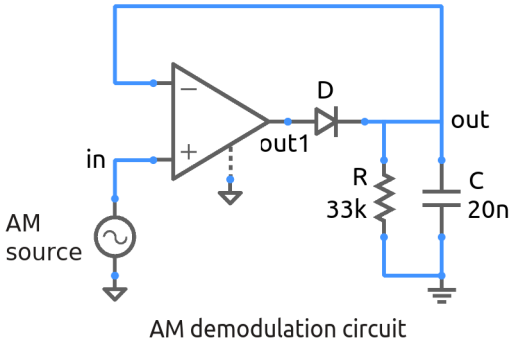
super_diode.sqproj



AM demodulation circuit

The Op Amp super diode[1] can be used as a peak detector circuit and can therefore be used for demodulation of an AM signal. In the circuit shown in the figure, the input is an AM signal. When the input voltage V_{in} is greater than the output voltage V_{out}, the capacitor gets charged with a small time constant (negligibly small as compared to the period of the carrier frequency), i.e., V_{out} simply follows V_{in}. When V_{in} is smaller than V_{out}, the super diode does not conduct, and the capacitor discharges through the resistor R. By selecting the R and C values appropriately, we can have a situation in which the output tracks the envelope of the input signal, thus enabling AM demodulation.

Exercise Set

1. Simulate the circuit, and plot V_{in} and V_{out} (together) versus time. Observe that the output voltage follows approximately the envelope of the AM signal. How will you retrieve the envelope from $V_{\text{out}}(t)$?

2. Simualte the circuit with $C = 5\,\text{nF}$, and plot $V_{\text{in}(t)}$ and $V_{\text{out}}(t)$. Would you prefer this capacitance value over 20 nF? Explain.

3. Simualte the circuit with $C = 40\,\text{nF}$, and plot $V_{\text{in}(t)}$ and $V_{\text{out}}(t)$. Would you prefer this capacitance value over 20 nF? Explain.

References

1. A. S. Sedra, K. C. Smith, and A. .N. Chandorkar, *Microelectronic Circuits*, Oxford University Press, 2004.

[1] See `super_diode_1.sqproj` for the opearation of the super diode circuit.