ee101_diode_circuit_5a.sqproj
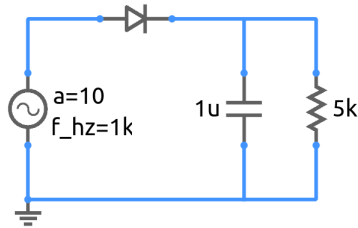

The diode circuit shown in the figure is similar to that in ee101_diode_circuit_5.sqproj. The diode allows charging of the capacitor, but blocks discharging. However, unlike the circuit of ee101_diode_circuit_5.sqproj, the capacitor can discharge through the resistor in this case. If the discharging is slow (compared to the period of the sinusoidal source voltage), the output voltage reduces marginally. When the source voltage exceeds the capacitor voltage, the capacitor charges again to the peak of the input sinusoid.

Note that the charging process here is also instantaneous since the capacitor sees a parallel combination of the load resistance and the diode resistance (which is very small) while charging.

Exercise Set

1. Estimate the ripple voltage V_R for the circuit parameters given in the simulation file. Simulate the circuit using $V_{on} = 0\,\text{V}$ for the diode, and compare your V_R value with the simulation result.

2. What is the effect of (a) increasing R by a factor of 2, (b) increasing C by a factor of 2? Verify with simulation.

3. What would you expect if $V_{on} = 0.7\,\text{V}$ for the diode? Verify with simulation.