`ee101_rc6.sqproj`

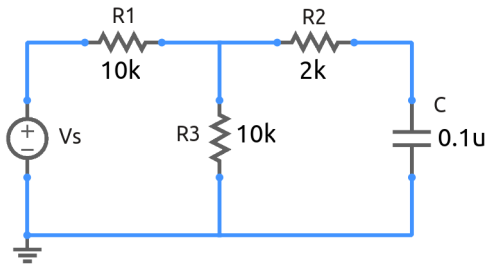

Figure 1: RC circuit with a step input.

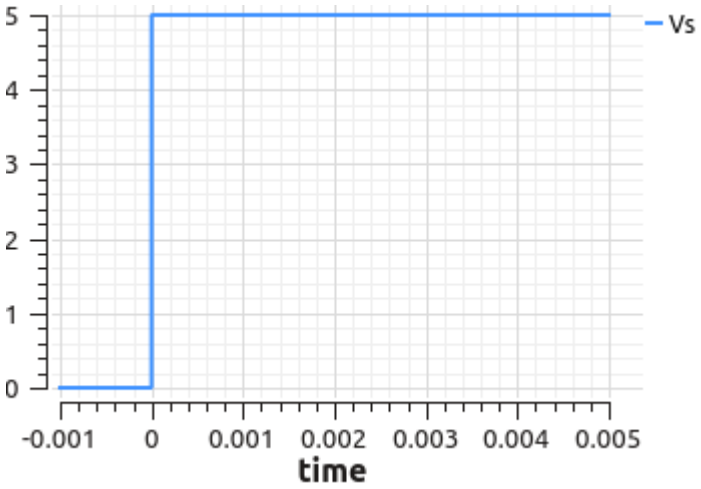

Figure 2: Step input voltage.

In the RC circuit shown in Fig. 1, the capacitor is initially uncharged. A step input as shown in Fig. 2 is applied.

Exercise Set

1. What is the circuit time constant?
2. Obtain expressions for the capacitor voltage and current for $t > 0\,\text{sec}$.
3. Obtain the current through R_3 in two ways: (a) Use $V_C(t)$ obtained in (2). (b) Start with the general form $i_{R3}(t) = A\,\exp(-t/\tau) + B$, find A and B using conditions on i_{R3} at $t = 0^+$ and $t \to \infty$.
4. Sketch $V_C(t)$, $i_C(t)$, and $i_{R3}(t)$ for $-1\,\text{ms} < t < 5\,\text{ms}$.
5. Check your answers against simulation results.