

Energy in a switched R - C circuit

Figure 1 shows a series switch- R - C circuit. The ideal switch is closed at time $t = 0$ and remains closed for $t > 0$. For $t < 0$, the voltage on the capacitor, v_c , is zero.

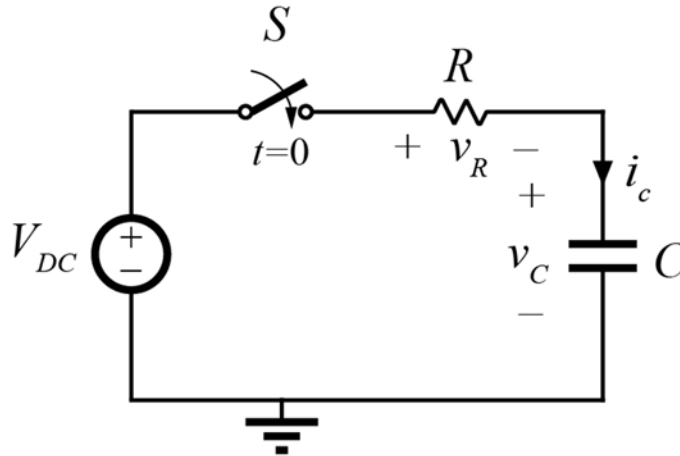


Figure 1: Switched R - C circuit

- Solve for a symbolic expression for the time-domain signals $v_c(t)$, $v_r(t)$, and $i_c(t)$ as functions of the variables, R , C , and V_{DC}
- Solve for the total energy stored in the capacitor, the total energy lost in the resistor, and the total energy supplied by the voltage source from $t = 0$ to $t = \infty$
- The resistance R is shorted. Under the same conditions, solve for the total energy stored in the capacitor and the total energy supplied by the voltage source from $t = 0$ to $t = \infty$