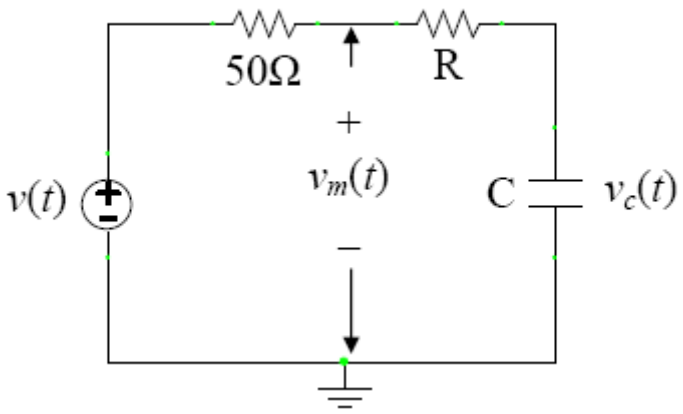
Example: Cable issue. Consider the following RC circuit, where a 50 Ω -cable is used. The voltage source v(t) is connected to the RC circuit through the 50 Ω -cable. The real voltage applied to RC is $v_m(t)$.

Cable



We can solve the differential equation to find $v_C(t) = A\left(1 - e^{-\frac{t}{\tau}}\right)u(t)$ and

$v_m(t) = A\left(1 - e^{-\frac{t}{\tau}} + \frac{RC}{\tau}e^{-\frac{t}{\tau}}\right)u(t)$ and τ=(R+50)C. Therefore, $V_m(t)$ is no longer an ideal step function.

How to make $V_m(t)$ close to an ideal step function?

(1) qualitatively should R be large or small?

(2) If R>>50Ω, what is $V_m(t)$?