Resistor-Capacitor Circuits

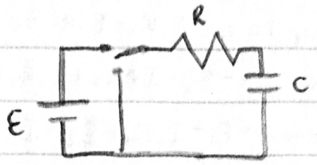
PH 112

Charge- Short time: wire

Long time: open switch

Discharge- Short time: battery

Long time: wire



Discharge

$\frac{dQ}{dt}R + \frac{Q}{C} = 0 \quad Q = Q_0 e^{-t/RC} = C\varepsilon e^{-t/RC}$

$I = \frac{\varepsilon}{R} e^{-t/RC} = I_0 e^{-t/RC}$

$\tau = RC$

Charge

$\varepsilon = R\frac{dQ}{dt} + \frac{Q}{C}$

$Q = Q_0(1 - e^{-t/RC}) = C\varepsilon(1 - e^{-t/RC})$