Answer on Question #82735, Physics / Electromagnetism

Question:

Derive the equation of charging and discharging of capacitor (in context of the concept of electrostatic) when DC voltage is applied?

Solution:

If an electrical circuit has resistor R, capacitor C and voltage source U, then $iR + \dfrac{q}{C} = U$; while

current $i = \dfrac{dq}{dt}$. Differentiating, we obtain the desirable equation: $\dfrac{d^2q}{dt^2} + \dfrac{1}{RC}\dfrac{dq}{dt} = 0$; it's

solution is well known and for the concrete case should be added by the particular solution of the inhomogeneous equation– if any - as well as to be concretized in accordance with initial and final conditions.

The answer:

$$\dfrac{d^2q}{dt^2} + \dfrac{1}{RC}\dfrac{dq}{dt} = 0$$