

task_I9hubowt6x00b2h5_with_calculation

Student Group

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Exercise E1 Determining the Current from Charge per Time

Two objects experience a charge increase over time, as shown in [figure 1](#). One object has a non-linear increase in the charge per time.

Result

A non-linear charge increase leads to a non-constant current.

For a non-constant current, one has to use the time derivative of the charge Q to get the current I .

So, the formula $I = \frac{dQ}{dt}$ has to be used instead of $I = \frac{\Delta Q}{\Delta t}$.

Fig. 1: Time course of the charge ...

1. Determine the currents I_1 and I_2 for the two objects from the Q - t -diagram [figure 1](#) and plot the currents into a new diagram.

Solution

- Have a look how much increase ΔQ per time duration Δt is there for each object.
- For this choose a distinct time period, e.g. between 0 s and 20 s .
- The current is then given as the change in charge per time: $I = \frac{\Delta Q}{\Delta t}$

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