task_l9hubowt6x00b2h5_with_calculation

Student Group

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Exercise E1 Determining the Current from Charge per Time

Two objects experience a charge increase, as per the change in figure 1. one object changes non-linearly 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 $I= {{{\rm d} Q}\over{{\rm d} t}}$ has to be used instead of $I= {{\Delta Q}\over{\Delta t}}$.
>
> 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 $0~\rm s$ and $20~\rm s$.
> - The current is then given as the change in charge per time: $I= {{\Delta Q}\over{\Delta t}}$

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