UofSC, Department of Physics & Astronomy.

Graduate student problem competition

Oct 23–Oct 29, 2023

All graduate students are eligible to participate.
To submit your solution, e-mail it to bazaliy@mailbox.sc.edu

I-V characteristic of a circuit

You are given a box with two wires coming of it. Inside the box there is a circuit shown in the figure. The battery has zero internal resistance, and its EMF is $\mathcal{E}$. The diodes are ideal: they have zero resistance for forward current and infinite resistance for backward current. All resistors have equal resistances of R.

Find the I-V characteristic of the box for both positive and negative voltages, and show it on a graph. Voltage applied to the box is considered positive when the upper wire has higher electric potential than the lower wire.

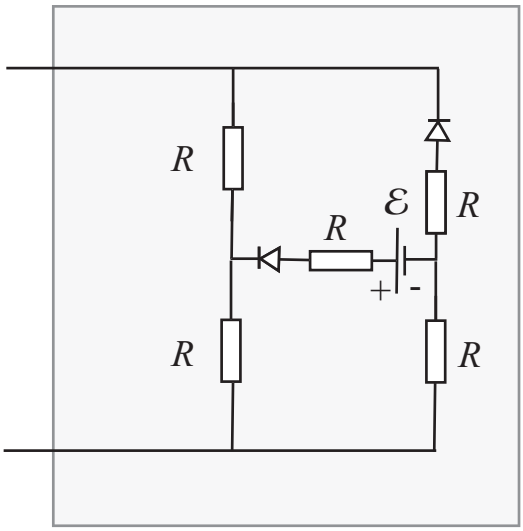

Figure 1: Circuit inside a box