

Physics Challenges for Teachers and Students

A Worldwide Problem-Solving Contest

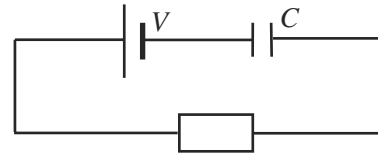


Now You C It, Now You Don't (Mr4)

An air-filled parallel-plate capacitor has capacitance C . The capacitor is connected through a resistor to a voltage source providing a constant potential difference V (see the diagram).

A dielectric plate with dielectric constant k is inserted into the capacitor, filling it completely. After the equilibrium is established, the plate is quickly removed. Find the amount of heat generated in the resistor by the time the equilibrium is reestablished.

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Submission Guidelines:

The deadline for submitting solutions to this problem is April 11, 2005.

- only email submissions will be considered;
- email your solutions to Boris Korsunsky at korsunbo@post.harvard.edu;
- please email the solutions as Word files;
- please email *each solution* as a separate file;
- note that each problem, in addition to a very clever title, has a code such as Mr1. Please name each file as “problem code-first initial-last name.” For instance, “Mr1DVader” if your name is Darth Vader and you are sending the solution to problem Mr1;
- please state your name, hometown, and professional affiliation in each file.

We look forward to your (and your students’) participation.

Please send correspondence to:

Boris Korsunsky
korsunbo@post.harvard.edu

The next *Challenge* problem will be posted online April 4.