

Electrodynamica — 24/6/2012

Om ambiguteit in terminologie te vermijden zijn de vragen in het Engels opgesteld. Als je bepaalde woorden of vragen in het Nederlands wilt vertaald krijgen kan je dit om het even wanneer komen vragen. Het examen is mondeling met schriftelijke voorbereiding.

1. Give a brief answer to the following questions and explain clearly and precisely why your answer is correct:
 - (a) I'm holding a jumping rope (*springtouw*) made entirely of copper in my hands and start jumping (I mean the thing people usually do with jumping ropes), somewhere on the surface of the earth. A current will flow through my body. Explain why.
 - (b) The net force on an electric dipole in a background electrostatic field \vec{E} can be written as $F_x = \vec{p} \cdot \vec{\nabla} E_x$, and similarly for F_y, F_z . Alternatively, it can be written as $\vec{F} = -\vec{\nabla} U$, where $U = -\vec{p} \cdot \vec{E}$ is the potential energy of the dipole. These two alternative expressions are not identical. Can you nevertheless reconcile them?
 - (c) A lightbulb is placed in series with an inductance, a capacitor, and an AC voltage source. When the frequency of the AC voltage is increased, will the light get brighter or darker, or does it depend on things I haven't told you?
 - (d) A glass of water is put in front of a bright white light. Some drops of milk are added to the water. What will happen to the color of the transmitted light?
 - (e) My sunglasses block horizontally polarized light. The sun is rising in the east and I am looking south. Does the blue of the sky look brighter or darker when I tilt my head to the right?
 - (f) A uniformly charged blob is oscillating with constant center of mass. Will there be dipole radiation?

Solve at least three out of the following six questions: