USC, Department of Physics & Astronomy.

Graduate student problem competition

Aug 16–Spt 1, 2024

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

Electric field distribution

A charge q is placed at the origin of coordinates. In addition, an external uniform field $\vec{E}_0 = (E_0, 0, 0)$, pointing along the x-axis ($E_0 > 0$), is present in the whole space. Together they produce the total space-dependent field $\vec{E}(r)$. Near the charge, $\vec{E}(r)$ is close to the field of the charge itself. Far away from the charge, it is close to $\vec{E}_0$. Find the largest value of y coordinate, for which it is possible to have the x-component of the total electric field satisfy $E_x \leq 0$.