Jackson Diamond

Electromagnetic Theory

Profesor Hanson

Final Project Proposal

For my project I will be breaking down and presenting over the following problem from the book:

Problem 4.32 Earnshaw's theorem (Prob. 3.2) says that you cannot trap a charged particle in an electrostatic field. *Question:* Could you trap a neutral (but polarizable) atom in an electrostatic field?

(a) Show that the force on the atom is F = 12 α∇(*E*2).

(b) The question becomes, therefore: Is it possible for *E*2 to have a local maximum (in a charge-free region)? In that case the force would push the atom back to its equilibrium position. Show that the answer is *no*. [*Hint:* Use Prob. 3.4(a).]22

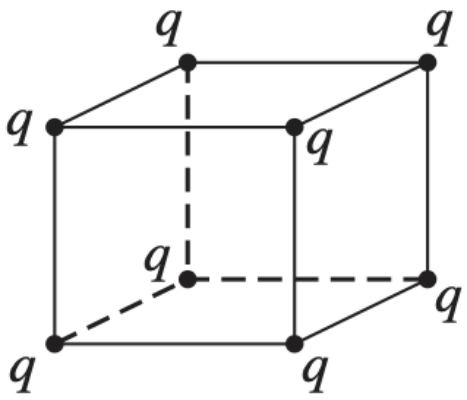
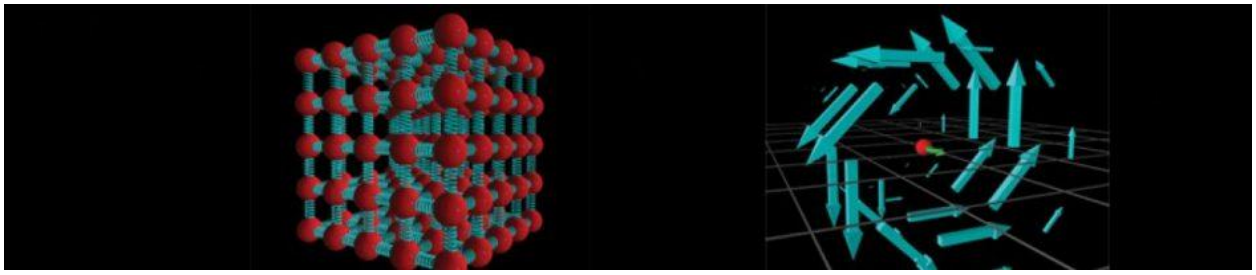


FIGURE 3.4

I will be doing this over a video where I will use a python interpreter I found online called glowscript, which can model 3 dimensional objects and show electric field lines. It can be found here https://www.glowscript.org/. This interpreter is python based and runs off a cloud server and should allow me to demonstrate my solution in real time over video.



This is a sample of some models created in the interpreter

I will break down the problem first with a power point before transitioning to code where I will demonstrate my solution. In the powerpoint I will have the full solution and the code will be kept brief. I may transition during my powerpoint to my code then back or share screenshots of steps I took creating the model. I will have to see what options are available with this interpreter and how far I can take the model. It would be super cool to make a short animation of the charge not being able to be trapped, but I am unsure how much this interpreter can do. Regardless, I will put together something cool that demonstrates the problem and the solution well. I believe by doing this I should be able to create a 10 min presentation that adequately explains the solution.