

Transformed E&M I materials

Method of Images (Griffiths Chapter 3)

STUDENT DIFFICULTIES

At this point in the course, students have seen a variety of methods for solving the potential in a region. To reduce cognitive load, it is helpful to give as many organizing principles as possible, and highlight important points of each method.

Applicability of Method of Images (*)

- Students struggle a little bit with the idea that you can only use method of images in the region where you have *not* placed the image charge (because the image charge changes V in that region). Griffiths pgs 83 has a good explanation. One student said she thought that Method of Images was “weird” because you’re changing the problem that you’re solving. However, actually calculating potentials using this method seems to pose little difficulty.
- On a post-test problem where students were given a conducting sphere and a point charge outside that sphere, the majority did not recognize it as a Method of Images problem. Thus, either they do not recognize a conducting *sphere* as appropriate for Method of Images, or they are not abstracting the general principle that Method of Images is useful for *conductors* in general.
- There was also some confusion as to whether the conductor needs to be grounded, but this is a relatively sophisticated point.

What is Method of Images doing? ()**

- Many students didn’t understand, in interviews, that Method of Images was solving Laplace’s Equation and that we were able to do it because of the Uniqueness Theorem. Only the best students could recall what the uniqueness theorem was. Even after being reminded what the uniqueness theorem was, some did not see its applicability to the Method of Images.
- Several students didn’t seem to recognize that matching the *boundary conditions* is what is important in Method of Images. This relates to their lack of understanding that Method of Images is solving Laplace and works because of Uniqueness. I think that clearing up this fundamental difficulty would help them understand the rationale and approach for Method of Images.