

CORRECTED ASSIGNMENT

87 1/2 %

Concept Assignment, Phys 458/2 A Advanced Electricity and Magnetism

Name: Sample student, ID # 123456

Date: January 11, 2001, Week #1

Sections covered: 3.10, 3.11, 3.12, 4.1

Mini Objectives:

- (i) ~~Understand totally~~ ^{unnecessary} Sec. 3.10 so that I can apply ^{Application of} Spherical Green's function expansion to solve electrostatic-potential problems.
- (ii) Understand how to use eigenfunction expansion for Green's function, including how to find the eigenvectors for the eigenvalue differential equation and how to expand a Green's function in terms of eigenfunctions.
- (iii) ~~Learn to solve capacitors with the new equation given in this section, and how to use~~ ^{unnecessary} virtual displacement to find the energy stored in a field.
- (iv) ~~Learn how to do~~ multipole expansion especially for cases more complicated than just the dipole along an axis.

Concepts:

- Spherical Green's function expansion can solve problems in the spherical boundary containing a charge distribution. This is especially easy when azimuthal symmetry is involved, but it is not the only type of problem that can be solved. One solves problems by forcing the charge density and using Eq. 3.124 integrating over the surface's volume of a sphere.
- If the potentials are the same, the eigenfunctions of the Schrodinger's equation for a particle in a potential can be used to find the Green's function. The Green's function, even at a point that is not an eigenvalue can be expanded in terms of the eigenfunctions of ψ . This is because the eigenfunctions are a complete orthonormal set at any time. A combination of them is a solution of Schrodinger's equation. This is useful if the eigenfunctions are easier to find than the Green's function.
- The energy stored in a field is equal to the charge brought to that point already there due to other charges.
- The energy of a continuous charge distribution is the charge density times the potential integrated over the volume of the distribution.
- Energy in a field can be found using above ways, or with virtual displacement technique, or by using techniques for finding capacitors.
- The potential due to a charge distribution can be found with the method of multipole expansion. This will give the exact potential although usually the largest terms dominate. The multipole methods are more numerous than in certain coordinates than in spherical, but they are still equivalent. Also, for multipole expansion, all terms except the largest non-vanishing one depend on the choice of origin.
- Other concepts were also explored (~~← This does not tell anything!~~)

N.B. This is not a perfect concept assignment, but quite good!

With the above corrections done, and some more details given in the "Concept" section, the student could get 100% marks.

Write this equation ←

More could be included on this sheet, had you not used large margins (top, bottom, left, right)