OVERVIEW of docs in this Smythe folder PhL 12.9.10

I downloaded Smythe Nov 5, 2009 after seeing the book referenced many times.

1. Smythe Section 5_27 on oblate spheroidal coordinates.doc created 12.3.09

I was interested in oblate coordinates at first just to do the charged disk, and later to do the on-axis Green's function for the disk in hopes of getting from there to the charged bowl. I had no real place to look that had details on oblates, but Smythe had a lot! So in this doc, I am just "taking notes" as I scan through Smythe's section on oblates. He talks about the "oblate harmonics" which I prefer to call the oblate atomic forms (at least one form, the one most used). He uses the atomic form to solve a problem of a metal iris in a uniform E field on one side. I studied this pretty hard and wrote a separate doc on the subject. The issue of parameterization was at first confusing to me. I did some Maple plots of the potential and remember being quite pleased with them. He then does torque on a disk in an E field, and then the Neumann Problem for a spheroid (ie, prescribed σ on spheroid). As a special case of that he gets a 1/R expansion in oblates which I later derived elsewhere. He then briefly does prolates, and his only problem is a prolate haystack in an E field of some sort. Then he is off on cylindricals.

2. Smythe hole in plate problems created 12.3.09

This doc has a 2 page overview. I had trouble with parameterization in the hole region. I solved this problem "my way" and duplicated his answer. I then solved the problem of the "charged iris" doing it the same "my way" and got an answer that is probably meaningful in terms of the central region of a huge disk.

3. Smythe General, and Review of Chapter 5 created 12.29.09

Between this and the last doc I did a Christmas Cape Cod visit. Here I learn about Smythe the person, and various editions of his book (mine is 1932) "Static and Dynamic Electricity" which is completely out of print (somebody wants $300 for the paperback!). I display all the chapter titles, and see that Chapter 5 is about "Three dimensional potential distributions". I then survey the very long sub-contents of this Chapter which is 107 pages of pretty dense stuff. I then do a "walk through" of this entire chapter, taking notes.

He has an interesting opening section discussing a condition a surface must satisfy to be an equipotential, reminds me a little of Stackel matrix stuff, and we are off into the ellipsoidals. He has some strange-looking formulas using variable θ, and out pops the Kelvin charge distribution on an ellipsoid, and then the potential of same. I actually do his θ integral and get this result. Then he is off on images, then the Neumann sphere problem, then a Cone Dirichlet problem using what I later call "the cone method". But on page 155 Smythe does mention n = ip - 1/2, and I comment on this in my spherical atoms section of the general atoms doc.

Now he starts on **Green's Functions** using what I now call the Smythian Form method. First is Green's for a **cone** where I ran into the Π function, a shifting of the Γ function. Next comes Green's for a **conical box**. Then the oblates which I took notes in the above separate file for. Then onto cylindricals. He does Green's for a **cylindrical box**. He ends with a list of **references** which includes Hobson, Jeans, Planck, Stratton, Ramsey, Watson on Bessel, and of course Maxwell.

4. **Green's Functions using the Smythe Method** created 1.1.10

This doc (56 pages) takes a detailed look at some of the sections mentioned in the general review doc above. Emphasis is on: the cone and conical box Green's problems, I then do the sphere Green's using this method (instead of the usual image method). I compare the Smythian Form method to Stak's list of Green's methods. I review his oblates stuff, and do details of the Neumann spheroid problem. I then do my own Dirichlet spheroid problem in section 8, and of course the special case of the charged spheroid and I compare that to the charged ellipsoid.

5. **Green's Functions using the Smythe Method META** created 6.24.10

This 13 page meta doc summarized the above doc, and also has a nice 1 page overview written 12.4.10 which I won't replicate here.