PHYS 3274 Homework 6

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1 Ch4 EX7

Index of Refraction in Water
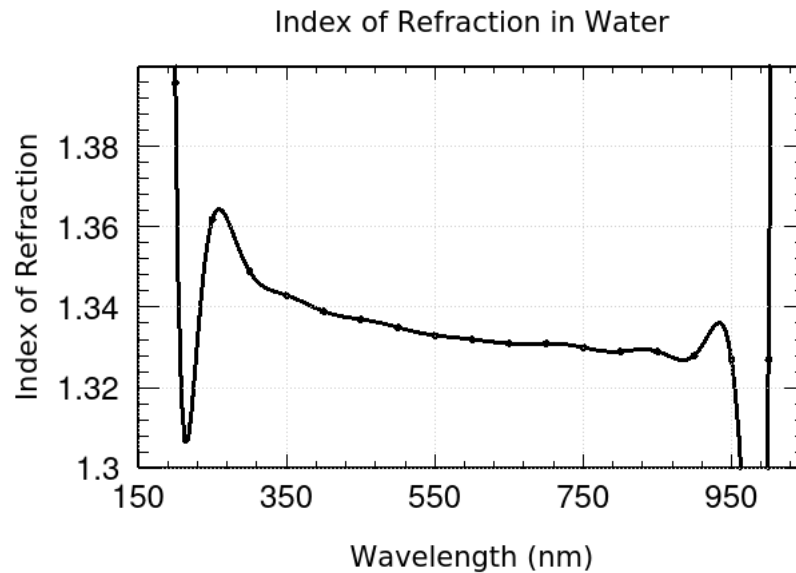
2 CH5 EX7

2.1 Part a

Part A, X

3.48808e-18 0.707107 9.21572e-18 6.69603e-16 6.50521e-19
0.707107 -2.49366e-17 1 2.0383e-17 4.50247e-15
2.31206e-17 1 4.98733e-17 1.22474 -7.63278e-17
6.83481e-16 1.99493e-17 1.22474 -7.63278e-17 1.41421

6.50521e-19 4.58487e-15 -7.63278e-17 1.41421 -3.33067e-16

2.2 Part b

Part B, X^2

0.5 4.66207e-18 0.707107 8.67362e-18 3.19623e-15
1.19262e-18 1.5 -5.20417e-18 1.22474 -4.16334e-17
0.707107 -5.20417e-18 2.5 -2.15106e-16 1.73205
-1.9082e-17 1.22474 -1.04083e-16 3.5 -5.82867e-16
3.15459e-15 -4.16334e-17 1.73205 -5.55112e-16 4.5

   Matrix A Squared:

0.5 -5.95071e-18 0.707107 2.66198e-17 4.13069e-15
7.95418e-18 1.5 5.64171e-17 1.22474 -4.70419e-17
0.707107 6.57182e-17 2.5 -1.19961e-16 1.73205
4.33431e-17 1.22474 -1.20395e-16 3.5 -6.72454e-16
4.20858e-15 -4.76552e-17 1.73205 -6.72454e-16 2

   There are some terms of B and A^2 that are the same but not all.

2.3 Part C

Part C (1) d/dx

-3.48639e-18 0.707107 -4.50215e-17 -1.99629e-15 2.21177e-17
-0.707107 -9.59519e-18 1 2.51535e-17 -2.00447e-15
-9.18861e-18 -1 -9.97466e-18 1.22474 3.29597e-17
-6.69495e-16 1.38778e-17 -1.22474 3.81639e-17 1.41421
-4.33681e-19 -3.25521e-15 4.85723e-17 -1.41421 2.22045e-16

   Part C (2) $\frac{d^2}{dx^2}$

0 0 0 0 0
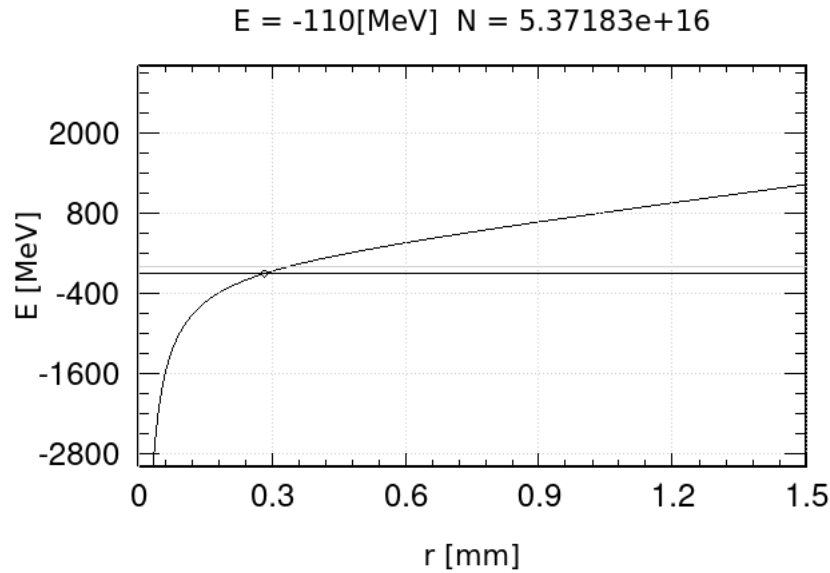0 0 0 0 0
0 0 0 0 0
0 0 0 0 0
0 0 0 0 0

2.4   Part D

Part D, H_SHO

0.5 -8.84235e-17 -1.10862e-15 2.46114e-17 3.56182e-15
1.7293e-17 1.5 3.28513e-17 2.70313e-15 2.08167e-17
-1.74794e-16 3.36103e-17 2.5 -4.33681e-17 1.72432e-14
7.99599e-19 1.37737e-15 -1.30972e-16 3.5 -3.33067e-16
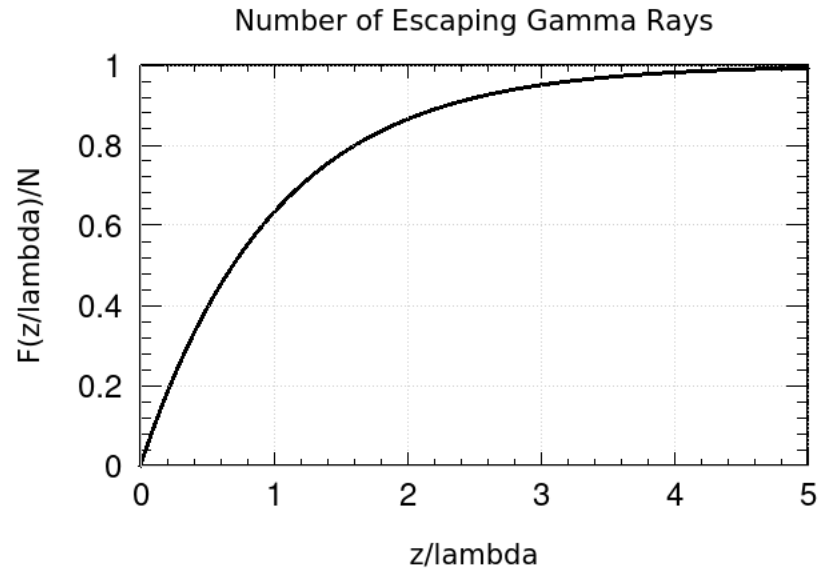4.16252e-16 -9.97466e-18 9.49241e-15 -9.02056e-17 4.5

3   CH5 EX9

I wrote the code for this but the N values are way too big so it just runs forever and never finds the correct value. I found out this was the issue by finding N for each energy (see the CharmPotZeros directory)

E = -110[MeV] N = 5.37183e+16

4   Ch5 EX12

4.1   Part a

$$F = \int_0^{z/\lambda} NP(x)dx$$

$$= \int_0^{z/\lambda} \frac{N}{\lambda} \exp{-x/\lambda}$$

$$= N(1 - \exp(-z/\lambda))$$

Number of Escaping Gamma Rays

4.2 Part b

$$f = \frac{n}{\tau}\left(1 - e^{-z/\lambda}\right) \tag{1}$$

4.3 Part c

$$N = \int_0^{\infty} \frac{n}{\tau}\left(1 - e^{-z/\lambda}\right) dz \tag{2}$$