PHYS 400 - THIN FILMS

18.01.2024 – 20.01.2024

Summary:
1) I have learned basics of the Qt5.
2) I wrote a python code that can generate wavelength vs. reflectance graph for n layer thin film with given refractive indices and thickness values. (For normally incident beam)

Summary of Recent Achievements

I am pleased to share the key highlights of my recent endeavors:

1. **Qt5 Designer Proficiency:** I acquired foundational skills in using Qt5 Designer and successfully applied its basics in Python.
2. **Pedrotti's "Introduction to Optics" - Chapter 19:** I dedicated time to studying Chapter 19, deepening my understanding of essential optical principles for thin films.
3. **Graph Generation with Python:** I developed a Python code to generate graphs, focusing on the relationship between refractive indices and material thicknesses. The code is basic, supporting a fixed incident angle of 0 degrees and accommodating a variable number of materials and thicknesses.

You can see what I have done below:

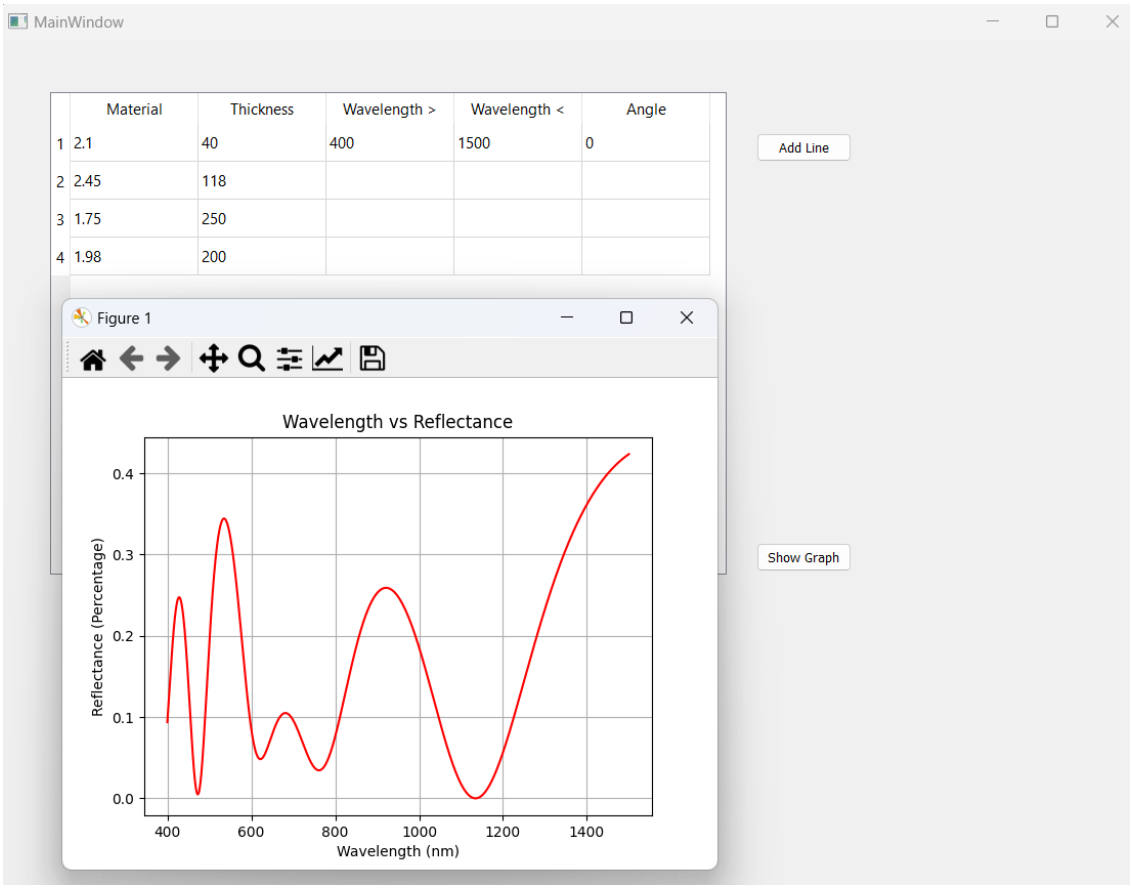

Figure 1: First design and successfully generated graph for 4-layer films.

Whether the system is working correctly or not was tested using the example question in the book and it was confirmed that it is working correctly.

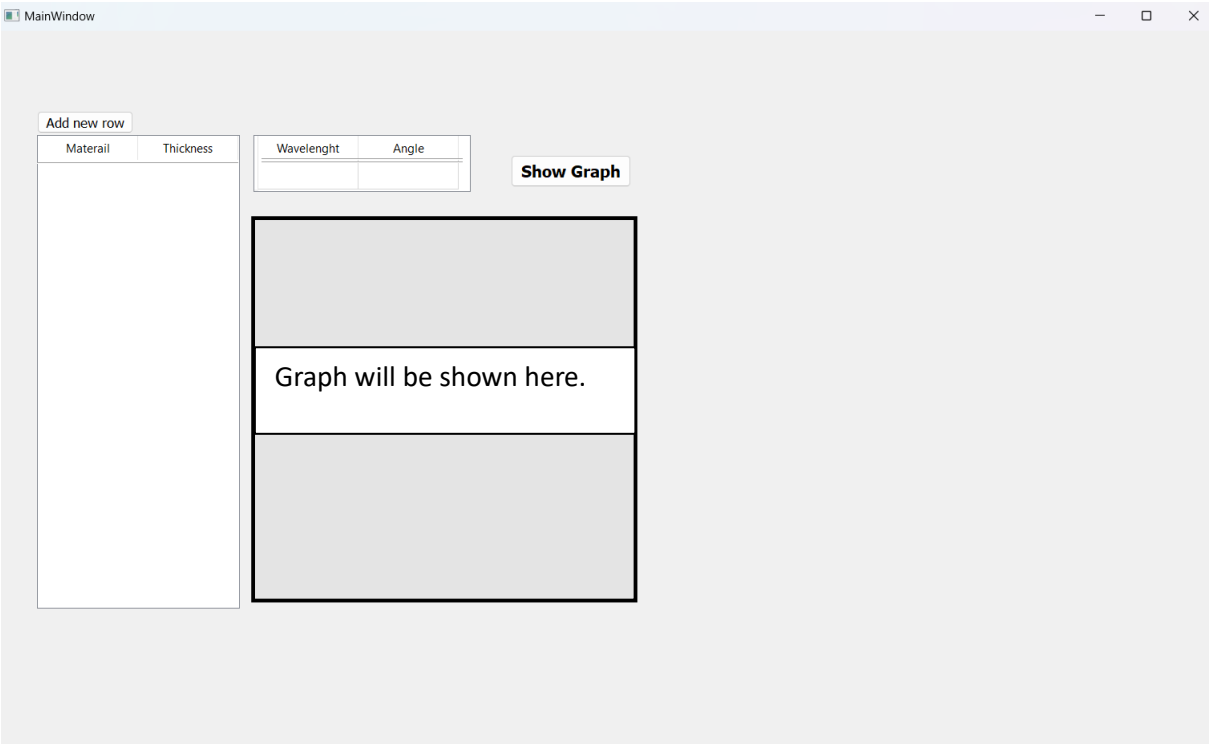

Figure 2: Second design is shown above.

I am planning to use the design in figure 2. In this design, I will be able to show the graph as shown. This can be improved later.

After combining the design with the Python code and making the necessary adjustments, I will organize the code in a way that allows me to consider angle values entered by the user, and I will attempt to incorporate these values into my calculations.

From the book (Page 399) (Pedrotti 2nd edition)

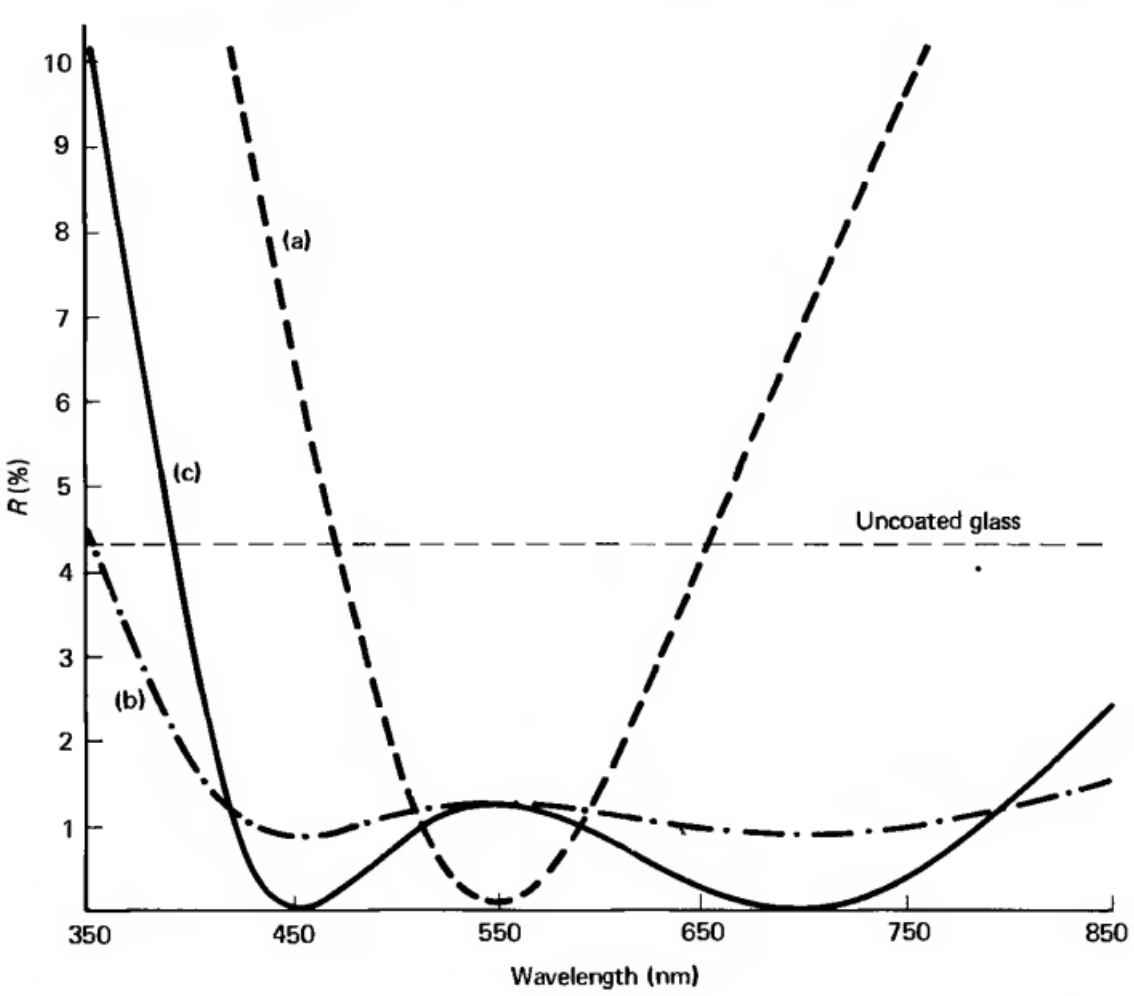

Figure 19-4 Reflectance from a double-layer film versus wavelength. In all cases $n_0 = 1$ and $n_s = 1.52$. Thicknesses are determined at $\lambda = 550$ nm. (a) $\lambda/4$-$\lambda/4$; $n_1 = 1.65$, $n_2 = 2.1$. (b) $\lambda/4$-$\lambda/2$: $n_1 = 1.38$, $n_2 = 1.6$. (c) $\lambda/4$-$\lambda/2$: $n_1 = 1.38$, $n_2 = 1.85$.

My results:

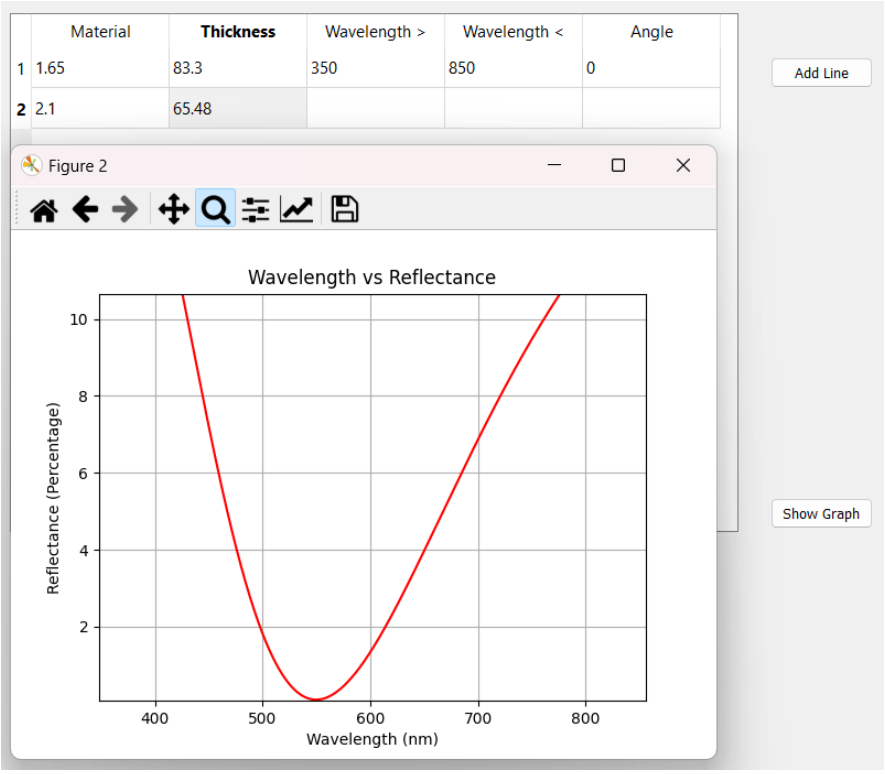

Figure 3: For graph a

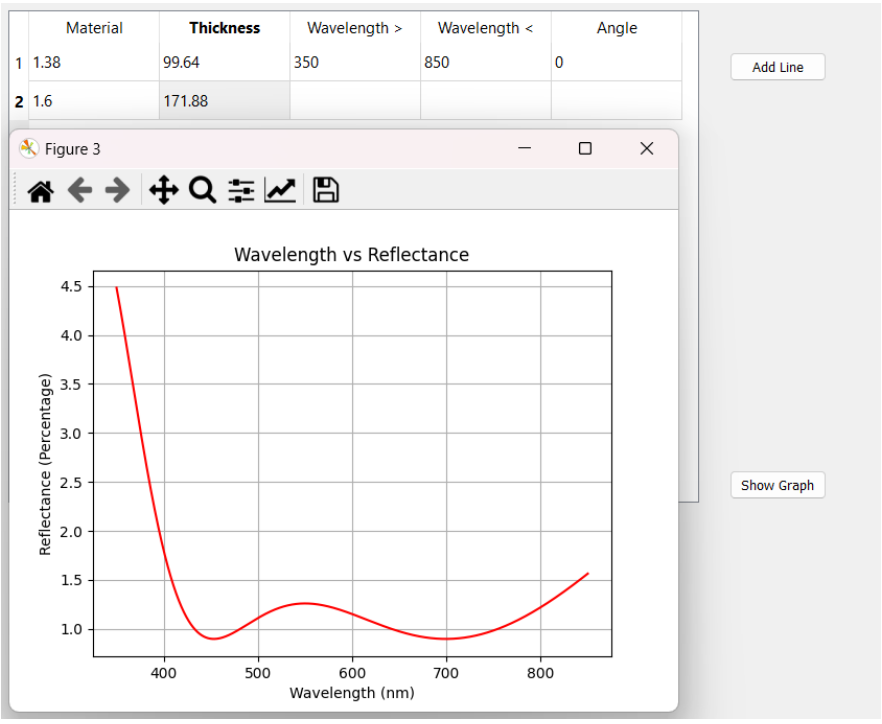

Figure 4: For graph b

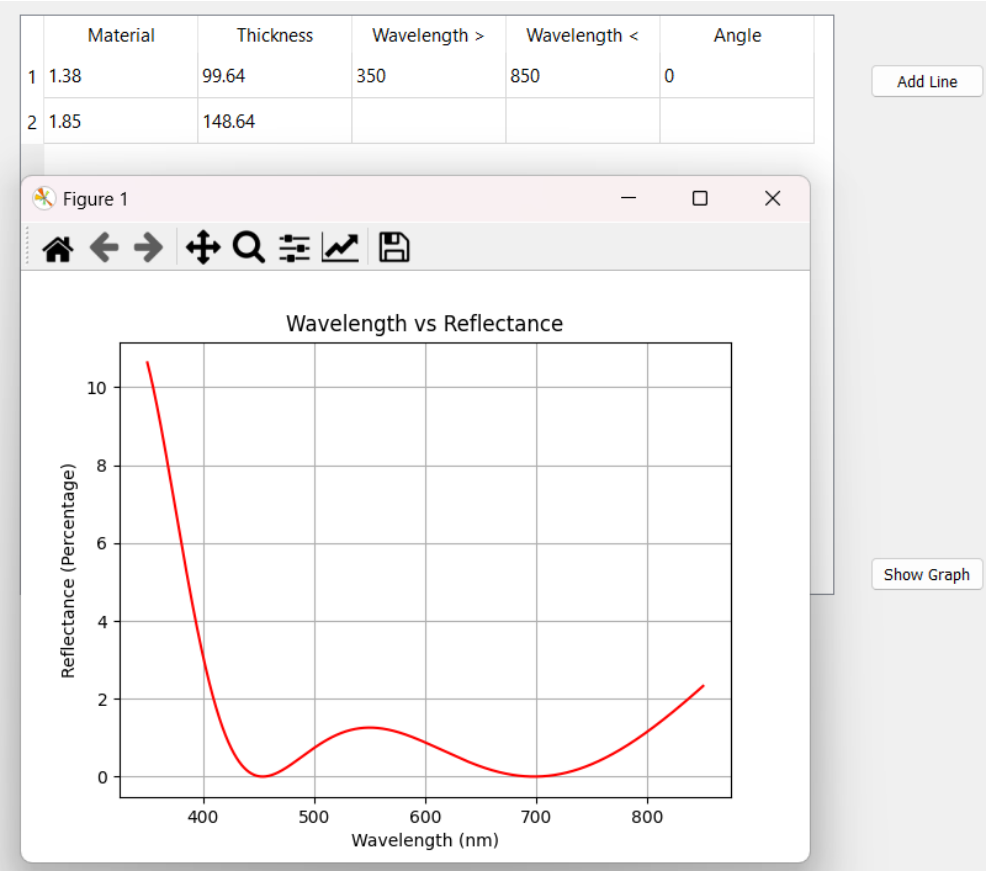

Figure 5:For graph c