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HW2 report

Problem 1

For the first problem, we were tasked with creating a python function *J(m,x)* that could calculate the output of a Bessel function using Simpson's Rule, given the *m* and *x* values. Using this function we had to plot the output of it for where *m* = 0,1,2 and *x* is in the range of 0 to 20 for each *m*. Bessel functions are used for many wave propagation problems such as light waves for this question [1]. The Bessel function for this problem is used to illustrate waves in a cylindrically symmetric system.

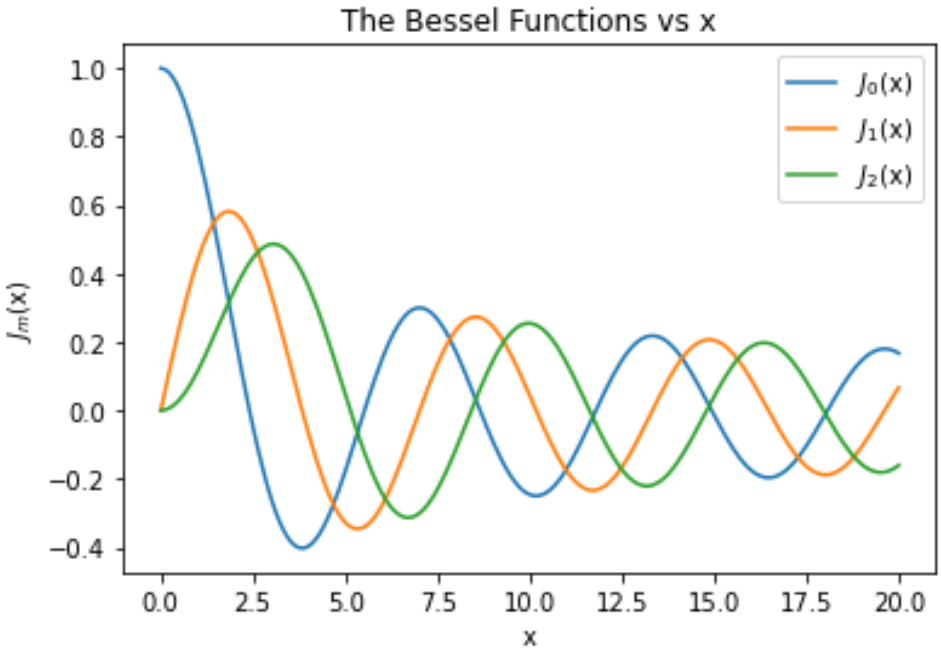

Figure 1: The Bessel Functions plot

Problem 2

For the second problem, we were tasked with creating a density plot of the intensity of the circular diffraction pattern of a point light source. Diffraction happens when light from a source passes through an aperture and it is basically a manifestation of the wave nature of the light. It produces a bright circular spot with a transition into a darker shade ring as shown in the figure below. The light intensity pattern in the plot below is known as the Airy disk [2].

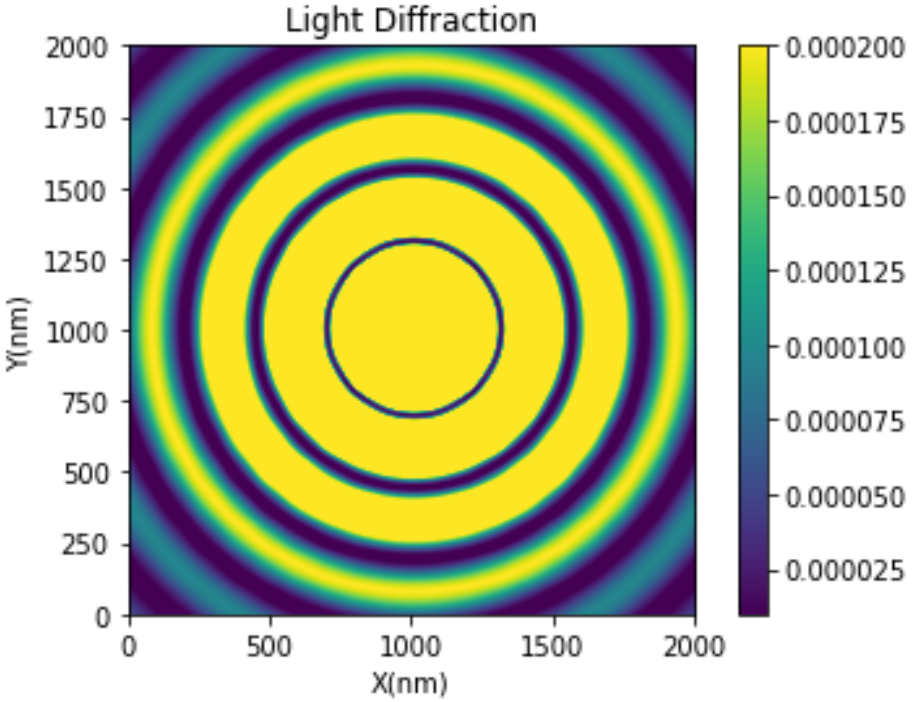

Figure 2: Light Diffraction

References

[1] “Chapter 5: Bessel functions,” *Physics*. [Online]. Available: https://www.physics.uoguelph.ca/chapter-5-bessel-functions. [Accessed: 11-Mar-2022].

[2] *Diffraction of light: Light bending around an object*. [Online]. Available: http://ww2010.atmos.uiuc.edu/(Gh)/guides/mtr/opt/mch/diff.rxml#:~:text=Diffraction%20is%20the%20slight%20bending,bending%20will%20be%20almost%20unnoticeable. [Accessed: 11-Mar-2022].