

Lab 2, Date:11/02/2021

1. Write a program, q.f90, to compute the following function and plot it against x , (10)

$$G_{k_0}(x) = \left(\frac{1}{\pi \delta^2} \right)^{1/4} \exp(-(x - x_0)^2 / 2\delta^2) \exp(-ik_0 x).$$

Take number of grid points = 128, $\delta = 0.25$, $x_0=10.0$, starting point of the grid = 0.5 and $\Delta x=0.15$. k_0 is related to E_{trans} through the relation $k_0 = \sqrt{2\mu E_{\text{trans}} - \frac{1}{2\delta^2}}$. Take $E_{\text{trans}} = 0.008$ and $\mu = 4056.5$. Write the output (two columns, x and the square of the absolute value of $G_{k_0}(x)$) to an output file. Plot the square of the absolute value of $G_{k_0}(x)$ vs x . Submit the code, the output file containing the data and the figure showing the graph.