Time Dependent Schrödinger Equation

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Abstract

In this project, we have analyzed the solutions to the Time Dependent Schödinger Equation obtained through the finite difference scheme. Two different methods have been implemented and the results from each algorithm are compared.

1 Free Particle

1.1 Comparing Methods

1.2 Boundary Conditions

2 Common Potentials

2.1 Infinite Square Well

2.2 Harmonic Oscillator

3 Barrier Potential

3.1 Transmition and Reflection Coefficients

3.2 Incident Energy Equal to the Barrier Height

4 Kronig-Penney Crystal

5 Non-Hermition Hamiltonian

We now look at the potential

$$V(x) = \begin{cases} ix & : -L < x << L \\ \infty & : x \leq -L, x \geq L \end{cases}$$