

REPORT

QUIZ 2,GROUP 2H

DESCRIPTION OF C-CODE

The c code uses rk45 method to solve the Langevin equation which describes the motion of the trapped particles

- The inputs for the program are taken from the command line
 - 1.N(number of steps)
 - 2.Tstart(starting temperature)
 - 3.Tstop(ending temperature)
 - 4.D(the size of the particle)
- The program solves the differential equation using rk45.
- b[N] is an array that stores the values of position.
- t[N] is an array that stores the values of time.
- The values of b and t for mean temperature are written in file data1.txt
- Then the rms value of data are found by varying the temperature.
- These values are stored in a file data.txt
- Then we use gnuplot to plot the graph of position vs time for mean temperature.
- Then we plot the value of rms velocity of particle vs temperature using gnuplot for different values of temperature.
- Inputs: Number of steps,Starting Temperature,Ending Temperature,Size of particle in nanometer
- Outputs: Plot of position vs time,Plot of rms value of position with temperature
- Compilation:cc 2H_q2.c -lm
- Command line:./a.out N Tstart Tend D (Preferably ./a.out 10000 270 370 500)

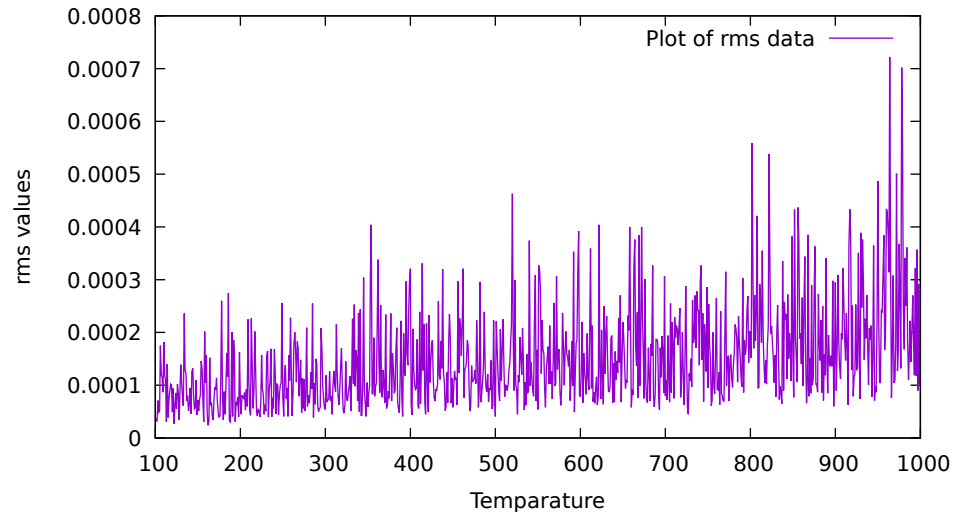
LEARNING OUTCOMES

- Use of arrays
- File handling and plotting graph with gnuplot.
- Observing and learning the motion of trapped particles and relation of the motion with temperature.
- Solving ordinary differential equations numerically
- Declaring and calling of functions.
- Taking input from the command line.

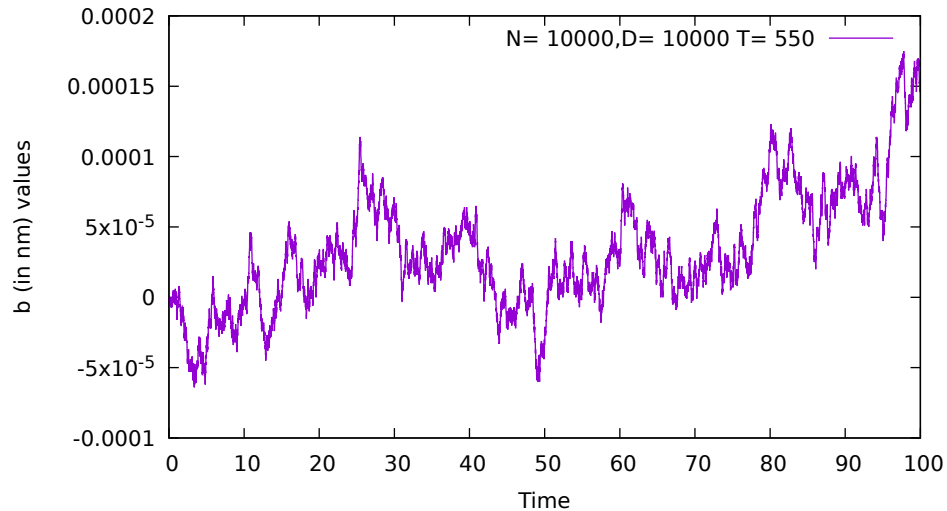
INFERENCES

- The following plots are obtained.
- The particle exhibits brownian motion.
- The rms value vs temperature has several peaks.
- A variable that is involved in a loop should be called each time when loop is run.
- The rate at which temperature is increasing is low.
- Since it is water temperature should range from 270 to 370 only.

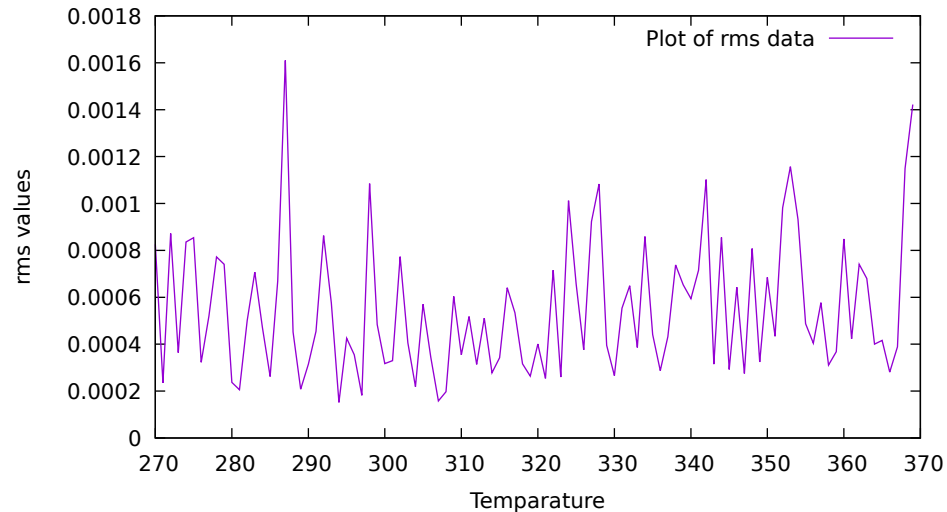
Plot of rms values (in nm) vs Temperature



Plot of b values vs Time



Plot of rms values (in nm) vs Temperature



Plot of b values vs Time

