Report for Exercise 07

Paul Fischer

April 26, 2022

1 Task 1

Here I simulated the system of $N = 30$ particles in a box of size 10 with periodic boundary conditions and I used the time discretization size $dt = 10^{-4}$. The resulting simulation is shown in the file Verlet-Simulation(L=30).mov which is in the folder ex07. In the stepVerlet function I was not sure how to handle the periodic boundary conditions: if one should use the v-current or v-current-pbc to calculate the force and v-next. Therefore, I am not so sure if my code works correctly.

2 Task 2

For task 2 I meassured the energy over time which can be seen in Figure 1. Note that the energy looks constant with some small fluctuations and therefore can be assumed to be constant as I would assume.

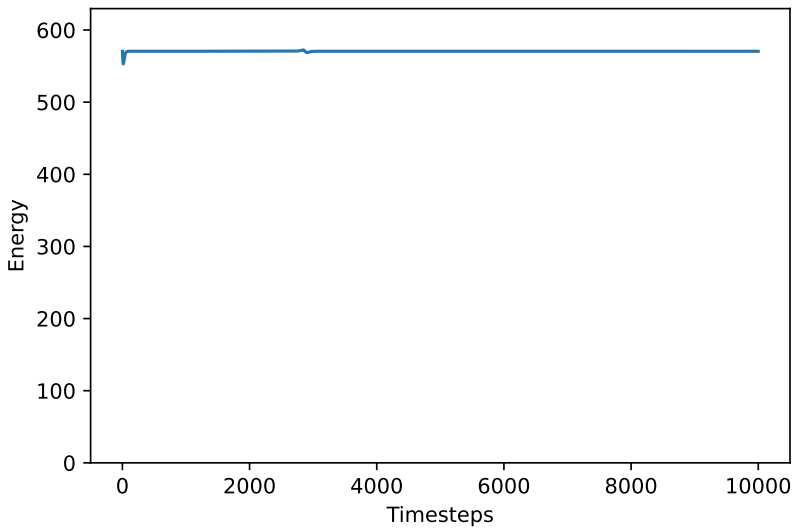

Figure 1: Energy over time for the Verlet-Simulation of 30 particles in a box of size $L = 10$ and $dt = 10^{-4}$.

3 Task 3

For task 3, I varied the time discretization size and observed how the Energy plot reacts to the changes. In Figure 2 one can see the energy over time plot for the simulation with a discretization size of $dt = 10^{-3}$. Looking at this plot one can see that the energy jumps a lot and thus is not conserved anymore.

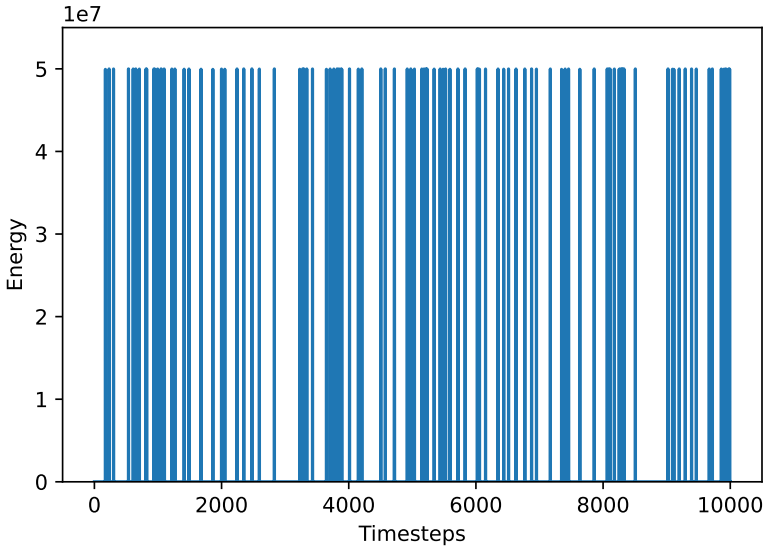

Figure 2: Energy over time for the Verlet-Simulation of 30 particles in a box of size $L = 10$ and $dt = 10^{-3}$.