Università della Svizzera italiana

Faculty of Informatics

Particle Mathods **2023**

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Report Assignment 4

1. Setup

For this assignment, I used C++ and matplotlibcpp for plotting.

2. Point A

For this point I used 2 different time steps to see how the system evolves: 0.01 and 0.001.

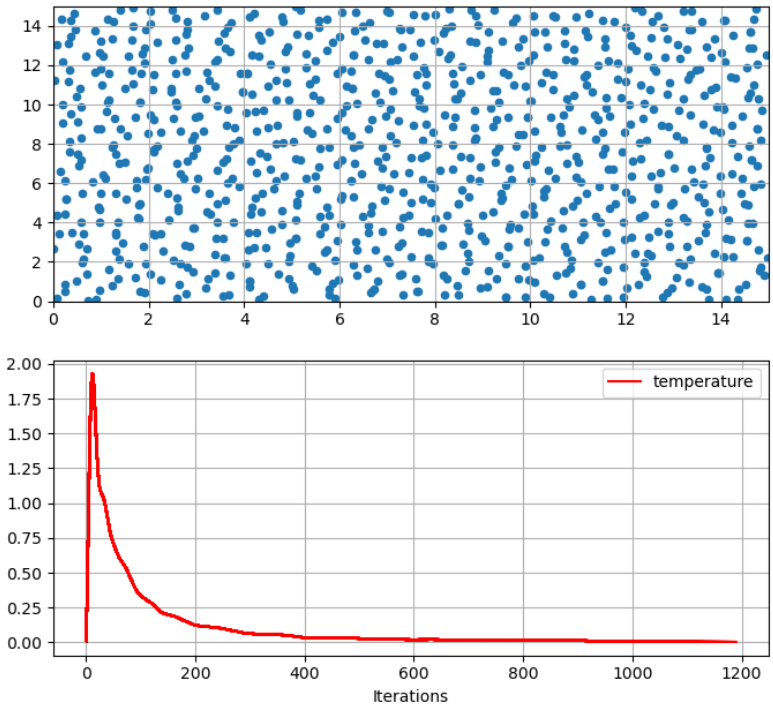

Figure 1: dt = 0.01

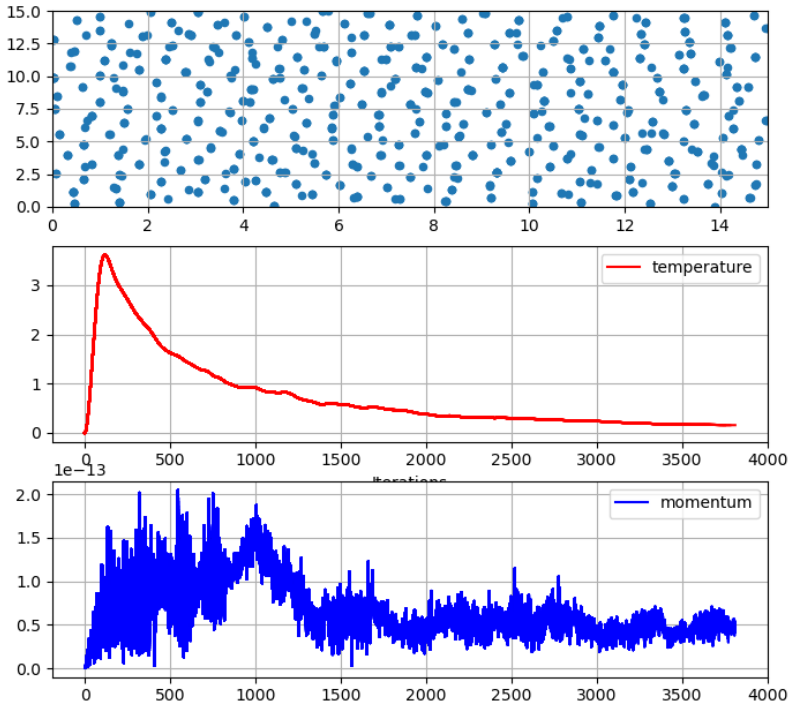

Figure 2: dt = 0.001

As one can see, the momentum is conserved in both cases. The temperature seems to converge but only with the smaller time step.

3. Point B

In both points B and C, the momentum is not conserved probably because the walls interact with other particles, but they are not affected by those since their motion is predefined (v_{wall} constant). After few iterations, the chains connect with each other, creating a fancy structures which persist over time. After 2000/3000 iterations, the temperature converges to the expected value. Interesting the fact that particles near by the walls follow the latter. Moreover, it seems that molecules repulse other particles.

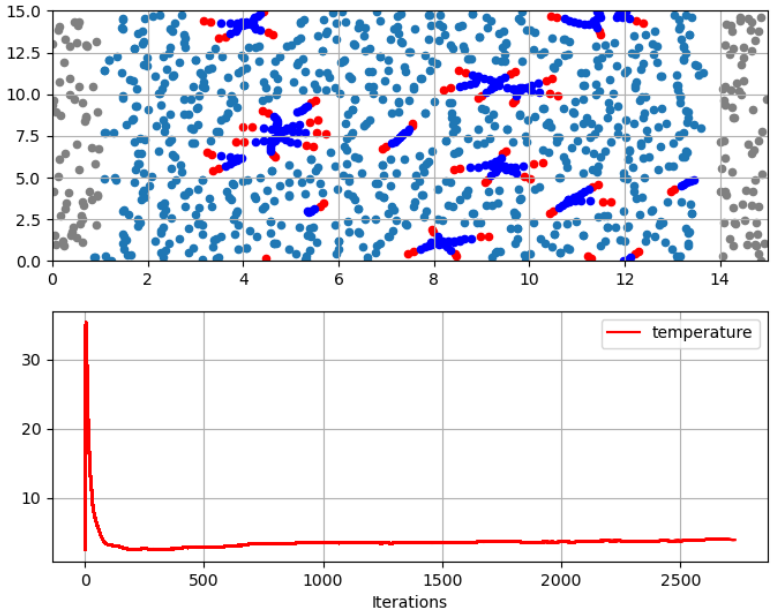

Figure 3: dt = 0.01

4. Point C

In this point, the temperature increases over time, not reaching the expected temperature (divergence). Moreover, the velocity of particles near the wall seem to slow down, whereas the particles in the middle approach a faster speed. The ring molecules maintain their structure over time.

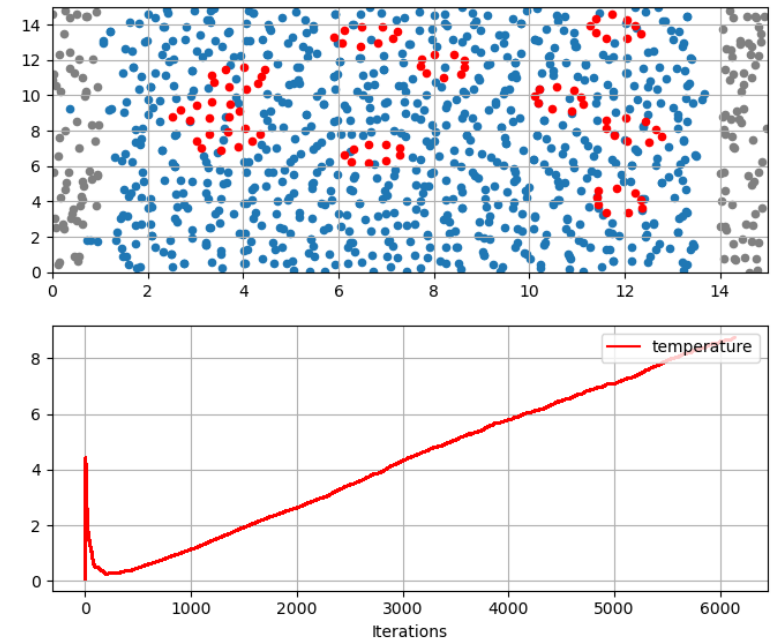

Figure 4: dt = 0.01