

HW 3.9 - Living Crystals

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Exercise 9.1. Active Brownian motion.

9.1.a

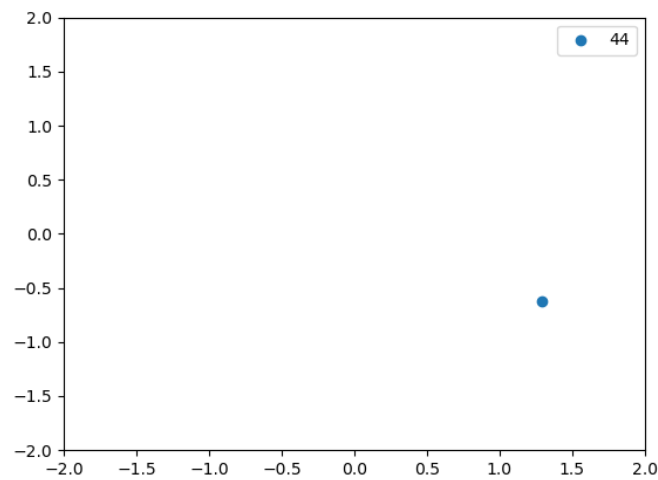


Figure 1: 1 particle moving in 2D

At this point the code simulates the trajectory of a single particle well.

9.1.b

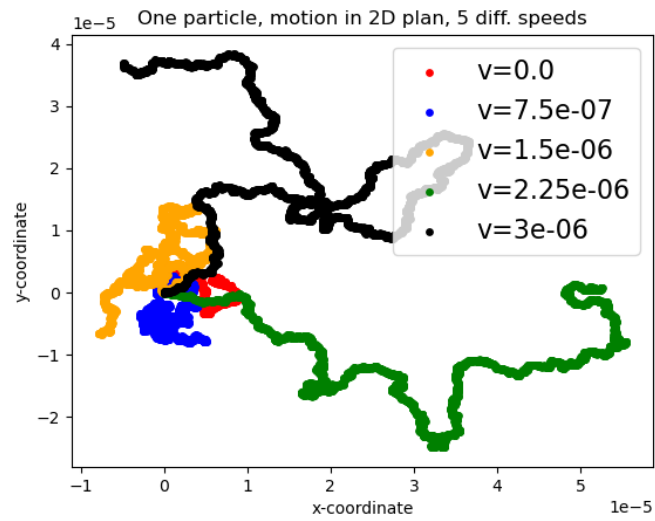


Figure 2: 1 particle moving in 2D, 5 diff. speeds

The bigger the speed, the greater the spread.

9.1.c

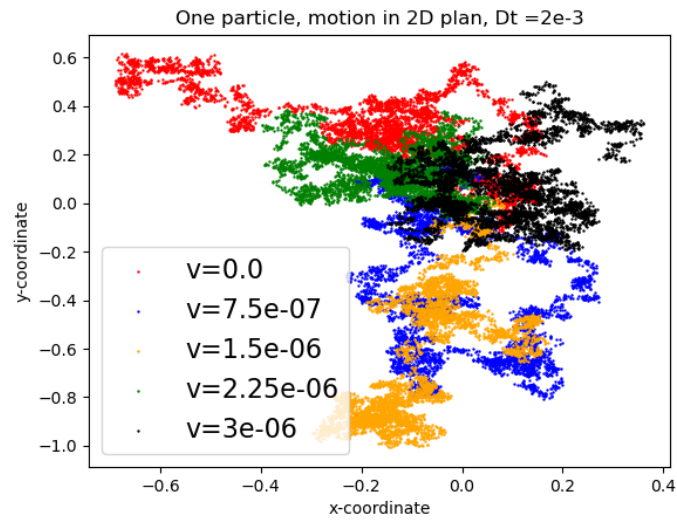


Figure 3: 1 particle moving in 2D, 5 diff. speeds, Dt big

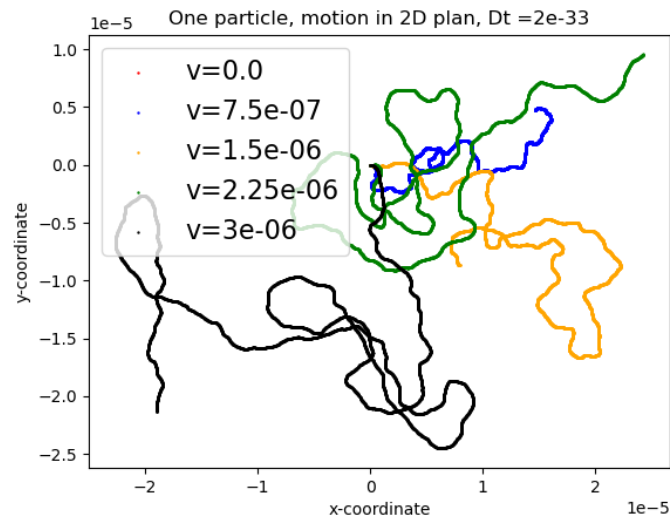


Figure 4: 1 particle moving in 2D, 5 diff. speeds, Dt small

Tuning Dt creates trajectories more or less direct.

9.1.d

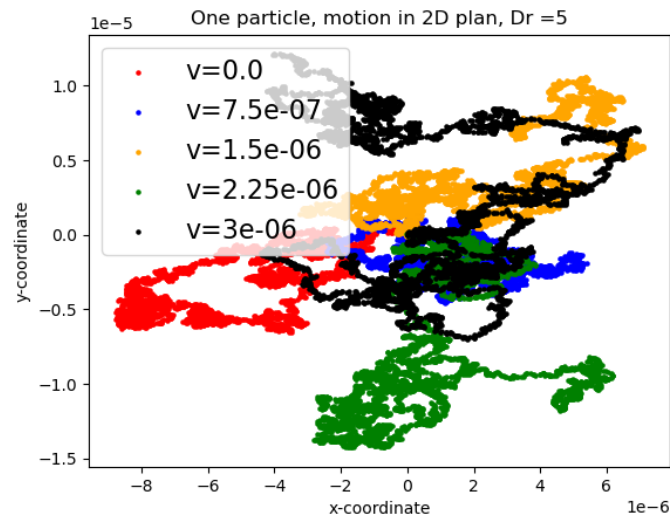


Figure 5: 1 particle moving in 2D, 5 diff. speeds, Dr big

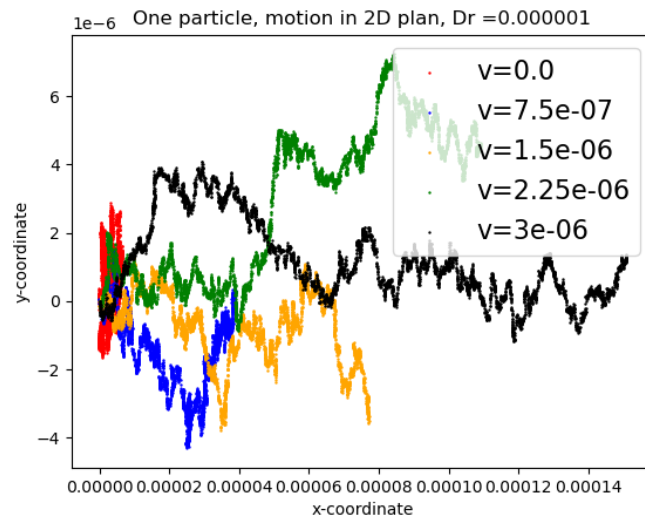


Figure 6: 1 particle moving in 2D, 5 diff. speeds, Dr small

High Dr: the particle circles around itself a lot. The opposite happens for Dr small.

9.2 Mean square displacement

9.2.a and b

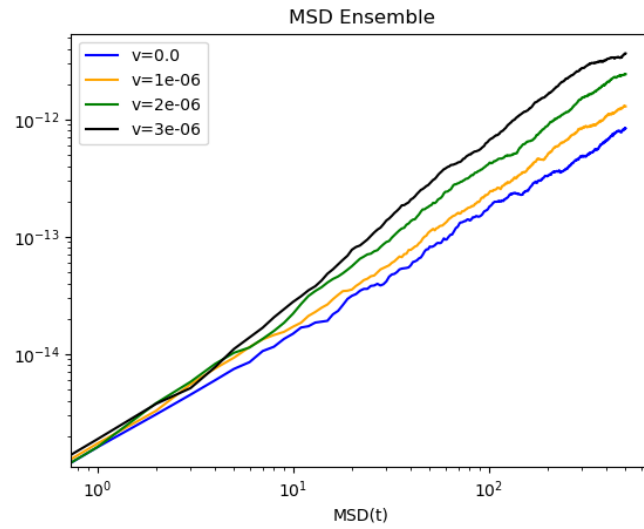


Figure 7: MSD ensemble

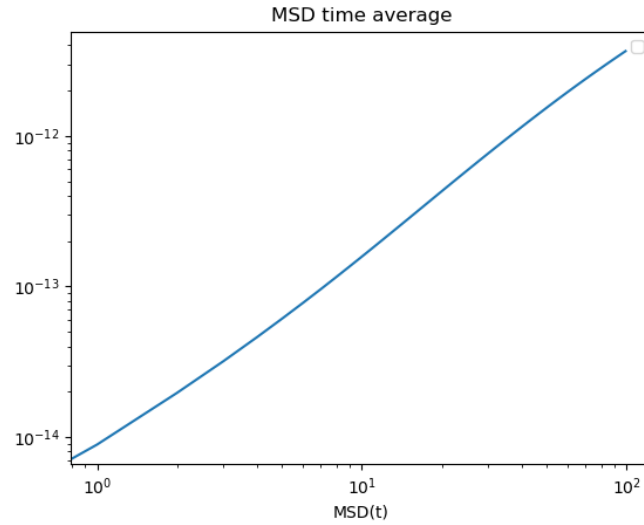


Figure 8: MSD time average

The twp MSD look similar.

9.3 Living Crystals

9.3.a: Many-particle simulation

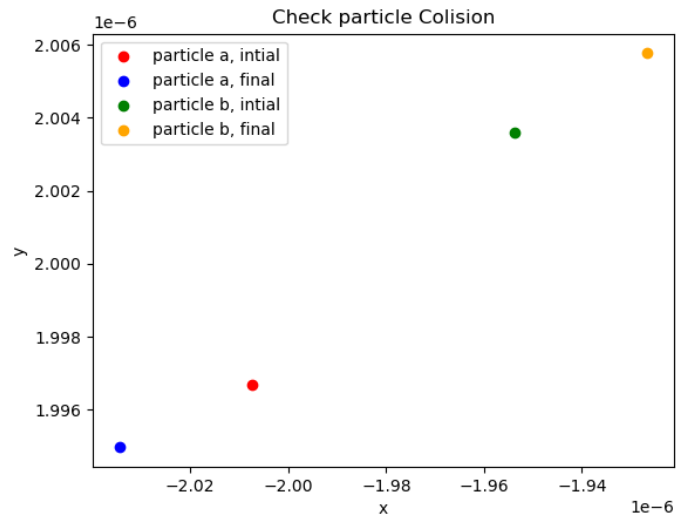


Figure 9: Check of particle collision

The particles are not perfectly aligned due to some minor mistake but it is very close to being correct.

9.3.b: Many-particle simulation

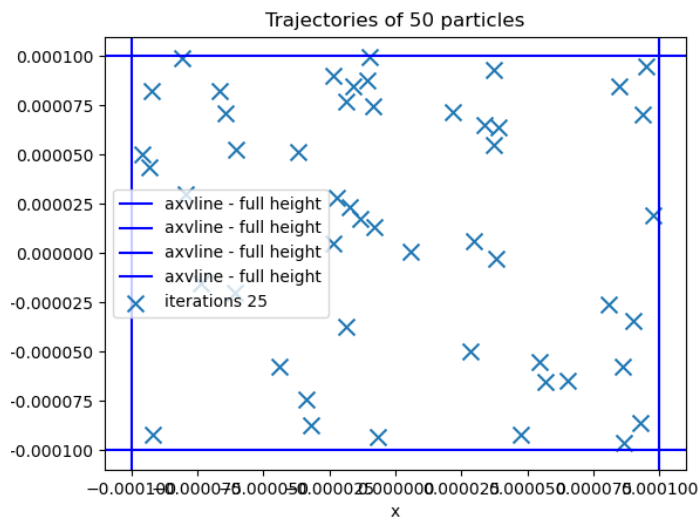


Figure 10: 50 particles

At this point, I believe I manage to successfully model the trajectory of 100 particles, however, I wish to discuss the rest of the exercises with the examiner. Perhaps a mistake blocks me in my understanding of the model.

9.3.c:

I would like to discuss this question with the examiner as I am not sure just yet.

9.3.d:

I would like to discuss this question with the examiner as I am not sure just yet.

9.4: Active particles with phoretic interactions**9.4.a:**

See the code with the examiner.

9.4.b:

I worked on this task, but I need to discuss with the examiner. Perhaps an error in my code prevents me from tuning the model well.

9.5: Living crystals**9.5.a:**

I worked on this task, but I need to discuss with the examiner. Perhaps an error in my code prevents me from tuning the model well.

9.5.b:

I worked on this task, but I need to discuss with the examiner. Perhaps an error in my code prevents me from tuning the model well.