

# TutR1.1\_\_bimolecular\_\_uni

April 30, 2024

## 1 Tutorial 1: RDME- Bimolecular Reaction\_\_Uniform Distribution

### 1.1 1-1 Uniformly Distribution

The purpose of this tutorial is to get users familiar with the `lm.jLM` functions and methods to build up RDME simulations.

For all the functions used here, you can check the [jLM api docs](#) for details.

### 1.2 0.Environment Check

if you didn't install the environments in docker or any container, we suggest you do it through anaconda/miniconda.

basically, you need to install the dependencies

```
conda env create -f rdme_env.yml
```

Then import jLM package.

```
[1]: import jLM                                # Set up the Jupyter environment
      from jLM.RDME import Sim as RDMESim      # Main simulation class
      from jLM.RegionBuilder import RegionBuilder # Deal with the spatial geometry
      from lm import IntMpdRdmeSolver          # lm::rdme::IntMpdRdmeSolver

      import numpy as np
```

<IPython.core.display.HTML object>

## 2 1. Initialization

### 2.1 1.1 RDME simulation object creation

First step is to create a object that contains all the essential information to start a simulation.

The class we use here is:

```
sim = jLM.RDME.Sim(simulation_name,
                   filename,
                   dimensions,
                   latticeSpacing,
```

```
regionName,
dt=None)
```

- simulation\_name is what we call our system;
- filename: the name of the final output trajectory file.(hdf5 format)
- dimensions: the number of lattices in x,y,z dimension. in list [dimx,dimy,dimz], must be divisible by 32.
- latticeSpacing: the actual physical representation of the length of each subvolume cube, unit: meter.
- the Name of the entire sim region, default="external"
- dt: time steps for the RDME simulation, unit: second.

```
[2]: cellvol = 1.0e-15          # L=dm^3
      simname = "Bimolecular_System_uni"
      filename = "TutR1.1_bimolecular_uni.lm"
      Ldim = [64,64,64]        # Has to be multiples of 32
      lattice_spacing = 32e-9   # in m
      regionN = "extracellular"
      dt = 25e-6               # in s
```

```
[3]: sim = RDMESim(  simname,
                     filename,
                     Ldim,
                     lattice_spacing,
                     regionN,
                     dt)
```

in case you forget, or want to redefine some key parameters in the simulation we define above, you can always call methods to adjust them.

for example, we can change the simulation time step by:

```
[4]: sim.timestep = 50e-6      # in s
```

next we need to define the total simulation time, the time interval to write results to our trajectory for lattice and species, normally we keep them the same.

Be careful, the unit for Interval is "time steps", and should be an integer.

The actual physical time for interval would be:

$$t = Interval * dt$$

since we define  $dt = 50 \times 10^{-6}s$ , the actual write interval would be:

$$20000 * 50 \times 10^{-6} = 0.1s$$

```
[5]: sim.simulationTime=30.0    # unit is seconds

      sim.latticeWriteInterval= int(2000)    # unit is timesteps, dt
      sim.speciesWriteInterval= int(2000)    # unit is timesteps, dt
```

## 2.2 1.2 Spatial Geometry Initialization

now, we need to add more spatial compartments to our system, for simplicity, our first toy system would only have three spatial regions: + extracellular + cytoplasm + plasm membrane

we want each of them mutually excluded, and if we combine them all together, it should be the entire lattice sites we create:

$$\text{lattice} = \text{extracellular} \cup \text{membrane} \cup \text{cytoplasm}$$

and naturally

$$\emptyset = \text{membrane} \cap \text{cytoplasm}$$

$$\emptyset = \text{membrane} \cap \text{extracellular}$$

$$\emptyset = \text{cytoplasm} \cap \text{extracellular}$$

In order to design the site lattice geometry, we create a `RegionBuilder` object, which reads the lattice dimensions from our simulation object `sim`.

```
[6]: build = RegionBuilder(sim)
```

we create a sphere to represent the cytoplasm with radius=25, center at [32,32,32]

```
[7]: radius = int(np.ceil((cellvol*3/4/np.pi)**(1/3)*0.1/lattice_spacing))
      print(radius)
      cytoplasm = build.ellipsoid(radius = radius, center = [32,32,32])
```

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Then we dilate the cytoplasm, and create a surface with the dilation method, and exclude the cytoplasm to represent our membrane

```
[8]: cytoplasm_dilation = build.dilate(cytoplasm, se = build.se26)
      membrane = cytoplasm_dilation & ~cytoplasm
```

Finally, make sure our extracellular region excludes the cell.

```
[9]: # effectively, cytoplasm_dilation = cytoplasm and membrane
      extracellular = ~cytoplasm_dilation
```

we need our simulation system to compose all the regions together.

```
[10]: cyt = sim.region('cytoplasm')
      mem = sim.region('membrane')
      ext = sim.region('extracellular')

[11]: build.compose(
      (sim.region('extracellular'), extracellular),
      (sim.region('cytoplasm'), cytoplasm),
      (sim.region('membrane'), membrane))
```

wonderful, now we have all the geometric information, we can visualize it in two different ways: stacks and 3D

```
[12]: sim.showRegionStack()
```

```
[12]: <IPython.core.display.HTML object>
```

```
[13]: sim.displayGeometry()
```

```
[13]: <IPython.core.display.HTML object>
```

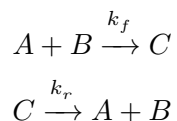
## 2.3 1.2 Species and diffusion Co. Initialization

For simplicity, we only want our bimolecular reaction take place in cytoplasm and only allow each species to diffuse in cytoplasm.

Our Template will be a reversible reaction as:



However, our software only accept one-way reaction, we need to separate it into two irreversible reactions:



initial condition:

#A = 1000

#B = 1000

#C = 0

```
[14]: spA = sim.species('A')
      spB = sim.species('B')
      spC = sim.species('C')
```

- function references:

`sim.species((str)name, [(str,latex)textPepr, (str)annotation])`

Then you can call the following function to check the relevant info about your species:

```
[15]: sim.showAllSpecies()
```

```
[15]: <IPython.core.display.HTML object>
```

```
[16]: sim.showSpecies('A')
```

```
[16]: <IPython.core.display.HTML object>
```

Now, you may notice all Diffusion rates are undefined, so we are going to **define all the diffusion coefficients** for each species.

```
[17]: sim.transitionRate(None, None, None, sim.diffusionZero) # initialization of the
      ↪diffusion rates to 0
```

define a custom made diffusion coefficient.

```
[18]: sim.diffusionConst('diff1', 1e-14)
```

```
[18]: <jLM.Types.DiffusionConst at 0x7f26176b3d30>
```

set diffusion rate:

```
[19]: sim.transitionRate(sim.species('A'), sim.region('cytoplasm'), sim.
      ↪region('cytoplasm'), sim.dc.diff1)
      # sim.transitionRate(spA, mem, mem, sim.dc.diff1)

      sim.transitionRate(spB, cyt, cyt, sim.dc.diff1)    # use defined diffusion rate
      sim.transitionRate(spC, cyt, cyt, sim.dc.diff1)
```

check the result:

```
[20]: sim.showAllSpecies()
```

```
[20]: <IPython.core.display.HTML object>
```

## 2.4 1.3 Reactions Initialization

```
[21]: NA = 6.022e23      # molecules/mole
      # kf = sim.rateConst('kf', 1.07e5/(NA*cellvol), 2)
      kf = sim.rateConst('kf', 1.07e5, 2)
      # rate constant for the reaction A + B -> C, second order, /M/s
      kr = sim.rateConst('kr', 0.351, 1)
      # rate constant for the reaction C -> A + B, first order, /s
```

Reactions can be added by the function:

```
jLM.RDME.Sim.region('region_name').addReaction([reactants],[products],
rate_const)
```

but remember, **all reactants, products and rate constants are corresponding jLM objects, not a number or string.**

Since we already define the name of the region we want to add reactions, there will be two ways you can add reactions:

```
[22]: sim.region('cytoplasm').addReaction([spA,spB], [spC], sim.rc.kf)
      cyt.addReaction([spC], [spA,spB], kr)
```

```
[22]: <jLM.Types.BuilderRegion at 0x7f261a3b4668>
```

Distribute a concentration of particles uniformly through cytoplasm:

```
[23]: sim.distributeNumber(spA, cyt, 1000)
      sim.distributeNumber(spB, cyt, 1000)
      sim.distributeNumber(spC, cyt, 0)
      # sim.sp.A.placeNumberInto(cyt, 1000)
```

```
[24]: sim.showAllSpecies()
```

```
[24]: <IPython.core.display.HTML object>
```

## 3 2 Check the system state

```
[25]: sim
```

```
[25]: <jLM.RDME.Sim at 0x7f261a34f6d8>
```

now we confirmed it is what we want, we can now proceed to finalize the simulation we create.

```
[26]: sim.finalize()
```

## 4 3. Run the Simulation

```
[27]: sim.run(solver=IntMpdRdmeSolver(), cudaDevices=[0])
```

```
2024-04-30 11:18:17) Info: Using 32 processor(s) and 1 CUDA device(s) per
process.
2024-04-30 11:18:17) Info: Assigning 1.00 processor(s) and 1.00 CUDA device(s)
per replicate.
2024-04-30 11:18:17) Info: Data output thread running.
2024-04-30 11:18:18) Info: Time is 0.100000000000000
2024-04-30 11:18:18) Info: Lattice write time is 0.100000000000000, in steps is
2000
2024-04-30 11:18:18) Info: Next lattice write time is 4000
2024-04-30 11:18:19) Info: Time is 0.200000000000000
2024-04-30 11:18:19) Info: Lattice write time is 0.200000000000000, in steps is
4000
2024-04-30 11:18:19) Info: Next lattice write time is 6000
2024-04-30 11:18:20) Info: Time is 0.300000000000000
2024-04-30 11:18:20) Info: Lattice write time is 0.300000000000000, in steps is
6000
```

2024-04-30 11:18:20) Info: Next lattice write time is 8000  
 2024-04-30 11:18:21) Info: Time is 0.4000000000000000  
 2024-04-30 11:18:21) Info: Lattice write time is 0.4000000000000000, in steps is 8000  
 2024-04-30 11:18:21) Info: Next lattice write time is 10000  
 2024-04-30 11:18:22) Info: Time is 0.5000000000000000  
 2024-04-30 11:18:22) Info: Lattice write time is 0.5000000000000000, in steps is 10000  
 2024-04-30 11:18:22) Info: Next lattice write time is 12000  
 2024-04-30 11:18:23) Info: Time is 0.6000000000000000  
 2024-04-30 11:18:23) Info: Lattice write time is 0.6000000000000000, in steps is 12000  
 2024-04-30 11:18:23) Info: Next lattice write time is 14000  
 2024-04-30 11:18:24) Info: Time is 0.7000000000000000  
 2024-04-30 11:18:24) Info: Lattice write time is 0.7000000000000000, in steps is 14000  
 2024-04-30 11:18:24) Info: Next lattice write time is 16000  
 2024-04-30 11:18:25) Info: Time is 0.8000000000000000  
 2024-04-30 11:18:25) Info: Lattice write time is 0.8000000000000000, in steps is 16000  
 2024-04-30 11:18:25) Info: Next lattice write time is 18000  
 2024-04-30 11:18:26) Info: Time is 0.9000000000000000  
 2024-04-30 11:18:26) Info: Lattice write time is 0.9000000000000000, in steps is 18000  
 2024-04-30 11:18:26) Info: Next lattice write time is 20000  
 2024-04-30 11:18:27) Info: Time is 1.0000000000000000  
 2024-04-30 11:18:27) Info: Lattice write time is 1.0000000000000000, in steps is 20000  
 2024-04-30 11:18:27) Info: Next lattice write time is 22000  
 2024-04-30 11:18:28) Info: Time is 1.1000000000000000  
 2024-04-30 11:18:28) Info: Lattice write time is 1.1000000000000000, in steps is 22000  
 2024-04-30 11:18:28) Info: Next lattice write time is 24000  
 2024-04-30 11:18:29) Info: Time is 1.2000000000000000  
 2024-04-30 11:18:29) Info: Lattice write time is 1.2000000000000000, in steps is 24000  
 2024-04-30 11:18:29) Info: Next lattice write time is 26000  
 2024-04-30 11:18:30) Info: Time is 1.3000000000000000  
 2024-04-30 11:18:30) Info: Lattice write time is 1.3000000000000000, in steps is 26000  
 2024-04-30 11:18:30) Info: Next lattice write time is 28000  
 2024-04-30 11:18:31) Info: Time is 1.4000000000000000  
 2024-04-30 11:18:31) Info: Lattice write time is 1.4000000000000000, in steps is 28000  
 2024-04-30 11:18:31) Info: Next lattice write time is 30000  
 2024-04-30 11:18:32) Info: Time is 1.5000000000000000  
 2024-04-30 11:18:32) Info: Lattice write time is 1.5000000000000000, in steps is 30000

2024-04-30 11:18:32) Info: Next lattice write time is 32000  
2024-04-30 11:18:33) Info: Time is 1.600000000000000  
2024-04-30 11:18:33) Info: Lattice write time is 1.600000000000000, in steps is 32000  
2024-04-30 11:18:33) Info: Next lattice write time is 34000  
2024-04-30 11:18:34) Info: Time is 1.700000000000000  
2024-04-30 11:18:34) Info: Lattice write time is 1.700000000000000, in steps is 34000  
2024-04-30 11:18:34) Info: Next lattice write time is 36000  
2024-04-30 11:18:35) Info: Time is 1.800000000000000  
2024-04-30 11:18:35) Info: Lattice write time is 1.800000000000000, in steps is 36000  
2024-04-30 11:18:35) Info: Next lattice write time is 38000  
2024-04-30 11:18:36) Info: Time is 1.900000000000000  
2024-04-30 11:18:36) Info: Lattice write time is 1.900000000000000, in steps is 38000  
2024-04-30 11:18:36) Info: Next lattice write time is 40000  
2024-04-30 11:18:37) Info: Time is 2.000000000000000  
2024-04-30 11:18:37) Info: Lattice write time is 2.000000000000000, in steps is 40000  
2024-04-30 11:18:37) Info: Next lattice write time is 42000  
2024-04-30 11:18:38) Info: Time is 2.100000000000000  
2024-04-30 11:18:38) Info: Lattice write time is 2.100000000000000, in steps is 42000  
2024-04-30 11:18:38) Info: Next lattice write time is 44000  
2024-04-30 11:18:39) Info: Time is 2.200000000000000  
2024-04-30 11:18:39) Info: Lattice write time is 2.200000000000000, in steps is 44000  
2024-04-30 11:18:39) Info: Next lattice write time is 46000  
2024-04-30 11:18:40) Info: Time is 2.300000000000000  
2024-04-30 11:18:40) Info: Lattice write time is 2.300000000000000, in steps is 46000  
2024-04-30 11:18:40) Info: Next lattice write time is 48000  
2024-04-30 11:18:41) Info: Time is 2.400000000000000  
2024-04-30 11:18:41) Info: Lattice write time is 2.400000000000000, in steps is 48000  
2024-04-30 11:18:41) Info: Next lattice write time is 50000  
2024-04-30 11:18:42) Info: Time is 2.500000000000000  
2024-04-30 11:18:42) Info: Lattice write time is 2.500000000000000, in steps is 50000  
2024-04-30 11:18:42) Info: Next lattice write time is 52000  
2024-04-30 11:18:43) Info: Time is 2.600000000000000  
2024-04-30 11:18:43) Info: Lattice write time is 2.600000000000000, in steps is 52000  
2024-04-30 11:18:43) Info: Next lattice write time is 54000  
2024-04-30 11:18:44) Info: Time is 2.700000000000000  
2024-04-30 11:18:44) Info: Lattice write time is 2.700000000000000, in steps is 54000



2024-04-30 11:18:44) Info: Next lattice write time is 56000  
 2024-04-30 11:18:45) Info: Time is 2.800000000000000  
 2024-04-30 11:18:45) Info: Lattice write time is 2.800000000000000, in steps is 56000  
 2024-04-30 11:18:45) Info: Next lattice write time is 58000  
 2024-04-30 11:18:45) Info: Time is 2.900000000000000  
 2024-04-30 11:18:45) Info: Lattice write time is 2.900000000000000, in steps is 58000  
 2024-04-30 11:18:45) Info: Next lattice write time is 60000  
 2024-04-30 11:18:46) Info: Time is 3.000000000000000  
 2024-04-30 11:18:46) Info: Lattice write time is 3.000000000000000, in steps is 60000  
 2024-04-30 11:18:46) Info: Next lattice write time is 62000  
 2024-04-30 11:18:47) Info: Time is 3.100000000000000  
 2024-04-30 11:18:47) Info: Lattice write time is 3.100000000000000, in steps is 62000  
 2024-04-30 11:18:47) Info: Next lattice write time is 64000  
 2024-04-30 11:18:48) Info: Time is 3.200000000000000  
 2024-04-30 11:18:48) Info: Lattice write time is 3.200000000000000, in steps is 64000  
 2024-04-30 11:18:48) Info: Next lattice write time is 66000  
 2024-04-30 11:18:49) Info: Time is 3.300000000000000  
 2024-04-30 11:18:49) Info: Lattice write time is 3.300000000000000, in steps is 66000  
 2024-04-30 11:18:49) Info: Next lattice write time is 68000  
 2024-04-30 11:18:50) Info: Time is 3.400000000000000  
 2024-04-30 11:18:50) Info: Lattice write time is 3.400000000000000, in steps is 68000  
 2024-04-30 11:18:50) Info: Next lattice write time is 70000  
 2024-04-30 11:18:51) Info: Time is 3.500000000000000  
 2024-04-30 11:18:51) Info: Lattice write time is 3.500000000000000, in steps is 70000  
 2024-04-30 11:18:51) Info: Next lattice write time is 72000  
 2024-04-30 11:18:52) Info: Time is 3.600000000000000  
 2024-04-30 11:18:52) Info: Lattice write time is 3.600000000000000, in steps is 72000  
 2024-04-30 11:18:52) Info: Next lattice write time is 74000  
 2024-04-30 11:18:53) Info: Time is 3.700000000000000  
 2024-04-30 11:18:53) Info: Lattice write time is 3.700000000000000, in steps is 74000  
 2024-04-30 11:18:53) Info: Next lattice write time is 76000  
 2024-04-30 11:18:54) Info: Time is 3.800000000000000  
 2024-04-30 11:18:54) Info: Lattice write time is 3.800000000000000, in steps is 76000  
 2024-04-30 11:18:54) Info: Next lattice write time is 78000  
 2024-04-30 11:18:55) Info: Time is 3.900000000000000  
 2024-04-30 11:18:55) Info: Lattice write time is 3.900000000000000, in steps is 78000

2024-04-30 11:18:55) Info: Next lattice write time is 80000  
2024-04-30 11:18:56) Info: Time is 4.000000000000000  
2024-04-30 11:18:56) Info: Lattice write time is 4.000000000000000, in steps is 80000  
2024-04-30 11:18:56) Info: Next lattice write time is 82000  
2024-04-30 11:18:57) Info: Time is 4.100000000000000  
2024-04-30 11:18:57) Info: Lattice write time is 4.100000000000000, in steps is 82000  
2024-04-30 11:18:57) Info: Next lattice write time is 84000  
2024-04-30 11:18:58) Info: Time is 4.200000000000000  
2024-04-30 11:18:58) Info: Lattice write time is 4.200000000000000, in steps is 84000  
2024-04-30 11:18:58) Info: Next lattice write time is 86000  
2024-04-30 11:18:59) Info: Time is 4.300000000000000  
2024-04-30 11:18:59) Info: Lattice write time is 4.300000000000000, in steps is 86000  
2024-04-30 11:18:59) Info: Next lattice write time is 88000  
2024-04-30 11:18:59) Info: Time is 4.400000000000000  
2024-04-30 11:18:59) Info: Lattice write time is 4.400000000000000, in steps is 88000  
2024-04-30 11:18:59) Info: Next lattice write time is 90000  
2024-04-30 11:19:00) Info: Time is 4.500000000000000  
2024-04-30 11:19:00) Info: Lattice write time is 4.500000000000000, in steps is 90000  
2024-04-30 11:19:00) Info: Next lattice write time is 92000  
2024-04-30 11:19:01) Info: Time is 4.600000000000000  
2024-04-30 11:19:01) Info: Lattice write time is 4.600000000000000, in steps is 92000  
2024-04-30 11:19:01) Info: Next lattice write time is 94000  
2024-04-30 11:19:02) Info: Time is 4.700000000000000  
2024-04-30 11:19:02) Info: Lattice write time is 4.700000000000000, in steps is 94000  
2024-04-30 11:19:02) Info: Next lattice write time is 96000  
2024-04-30 11:19:03) Info: Time is 4.800000000000000  
2024-04-30 11:19:03) Info: Lattice write time is 4.800000000000000, in steps is 96000  
2024-04-30 11:19:03) Info: Next lattice write time is 98000  
2024-04-30 11:19:04) Info: Time is 4.900000000000000  
2024-04-30 11:19:04) Info: Lattice write time is 4.900000000000000, in steps is 98000  
2024-04-30 11:19:04) Info: Next lattice write time is 100000  
2024-04-30 11:19:05) Info: Time is 5.000000000000000  
2024-04-30 11:19:05) Info: Lattice write time is 5.000000000000000, in steps is 100000  
2024-04-30 11:19:05) Info: Next lattice write time is 102000  
2024-04-30 11:19:06) Info: Time is 5.100000000000000  
2024-04-30 11:19:06) Info: Lattice write time is 5.100000000000000, in steps is 102000

2024-04-30 11:19:06) Info: Next lattice write time is 104000  
2024-04-30 11:19:07) Info: Time is 5.200000000000000  
2024-04-30 11:19:07) Info: Lattice write time is 5.200000000000000, in steps is 104000  
2024-04-30 11:19:07) Info: Next lattice write time is 106000  
2024-04-30 11:19:08) Info: Time is 5.300000000000000  
2024-04-30 11:19:08) Info: Lattice write time is 5.300000000000000, in steps is 106000  
2024-04-30 11:19:08) Info: Next lattice write time is 108000  
2024-04-30 11:19:09) Info: Time is 5.400000000000000  
2024-04-30 11:19:09) Info: Lattice write time is 5.400000000000000, in steps is 108000  
2024-04-30 11:19:09) Info: Next lattice write time is 110000  
2024-04-30 11:19:10) Info: Time is 5.500000000000000  
2024-04-30 11:19:10) Info: Lattice write time is 5.500000000000000, in steps is 110000  
2024-04-30 11:19:10) Info: Next lattice write time is 112000  
2024-04-30 11:19:11) Info: Time is 5.600000000000000  
2024-04-30 11:19:11) Info: Lattice write time is 5.600000000000000, in steps is 112000  
2024-04-30 11:19:11) Info: Next lattice write time is 114000  
2024-04-30 11:19:12) Info: Time is 5.700000000000000  
2024-04-30 11:19:12) Info: Lattice write time is 5.700000000000000, in steps is 114000  
2024-04-30 11:19:12) Info: Next lattice write time is 116000  
2024-04-30 11:19:13) Info: Time is 5.800000000000000  
2024-04-30 11:19:13) Info: Lattice write time is 5.800000000000000, in steps is 116000  
2024-04-30 11:19:13) Info: Next lattice write time is 118000  
2024-04-30 11:19:14) Info: Time is 5.900000000000000  
2024-04-30 11:19:14) Info: Lattice write time is 5.900000000000000, in steps is 118000  
2024-04-30 11:19:14) Info: Next lattice write time is 120000  
2024-04-30 11:19:15) Info: Time is 6.000000000000000  
2024-04-30 11:19:15) Info: Lattice write time is 6.000000000000000, in steps is 120000  
2024-04-30 11:19:15) Info: Next lattice write time is 122000  
2024-04-30 11:19:15) Info: Time is 6.100000000000000  
2024-04-30 11:19:15) Info: Lattice write time is 6.100000000000000, in steps is 122000  
2024-04-30 11:19:15) Info: Next lattice write time is 124000  
2024-04-30 11:19:16) Info: Time is 6.200000000000000  
2024-04-30 11:19:16) Info: Lattice write time is 6.200000000000000, in steps is 124000  
2024-04-30 11:19:16) Info: Next lattice write time is 126000  
2024-04-30 11:19:17) Info: Time is 6.300000000000000  
2024-04-30 11:19:17) Info: Lattice write time is 6.300000000000000, in steps is 126000

2024-04-30 11:19:17) Info: Next lattice write time is 128000  
 2024-04-30 11:19:17) Info: Wrote 64 data sets (1073744448 bytes) in the last 60.07 seconds (1.94 seconds writing). 0 datasets queued. Flushing.  
 2024-04-30 11:19:18) Info: Average walltime per timestep: 0.48 ms. Progress: 6.3144s/30.0000s ( 21% done / 3.8 minutes walltime remaining)  
 2024-04-30 11:19:18) Info: Time is 6.400000000000000  
 2024-04-30 11:19:18) Info: Lattice write time is 6.400000000000000, in steps is 128000  
 2024-04-30 11:19:18) Info: Next lattice write time is 130000  
 2024-04-30 11:19:19) Info: Time is 6.500000000000000  
 2024-04-30 11:19:19) Info: Lattice write time is 6.500000000000000, in steps is 130000  
 2024-04-30 11:19:19) Info: Next lattice write time is 132000  
 2024-04-30 11:19:20) Info: Time is 6.600000000000000  
 2024-04-30 11:19:20) Info: Lattice write time is 6.600000000000000, in steps is 132000  
 2024-04-30 11:19:20) Info: Next lattice write time is 134000  
 2024-04-30 11:19:21) Info: Time is 6.700000000000000  
 2024-04-30 11:19:21) Info: Lattice write time is 6.700000000000000, in steps is 134000  
 2024-04-30 11:19:21) Info: Next lattice write time is 136000  
 2024-04-30 11:19:22) Info: Time is 6.800000000000000  
 2024-04-30 11:19:22) Info: Lattice write time is 6.800000000000000, in steps is 136000  
 2024-04-30 11:19:22) Info: Next lattice write time is 138000  
 2024-04-30 11:19:23) Info: Time is 6.900000000000000  
 2024-04-30 11:19:23) Info: Lattice write time is 6.900000000000000, in steps is 138000  
 2024-04-30 11:19:23) Info: Next lattice write time is 140000  
 2024-04-30 11:19:24) Info: Time is 7.000000000000000  
 2024-04-30 11:19:24) Info: Lattice write time is 7.000000000000000, in steps is 140000  
 2024-04-30 11:19:24) Info: Next lattice write time is 142000  
 2024-04-30 11:19:25) Info: Time is 7.100000000000000  
 2024-04-30 11:19:25) Info: Lattice write time is 7.100000000000000, in steps is 142000  
 2024-04-30 11:19:25) Info: Next lattice write time is 144000  
 2024-04-30 11:19:26) Info: Time is 7.200000000000000  
 2024-04-30 11:19:26) Info: Lattice write time is 7.200000000000000, in steps is 144000  
 2024-04-30 11:19:26) Info: Next lattice write time is 146000  
 2024-04-30 11:19:27) Info: Time is 7.300000000000000  
 2024-04-30 11:19:27) Info: Lattice write time is 7.300000000000000, in steps is 146000  
 2024-04-30 11:19:27) Info: Next lattice write time is 148000  
 2024-04-30 11:19:28) Info: Time is 7.400000000000000  
 2024-04-30 11:19:28) Info: Lattice write time is 7.400000000000000, in steps is 148000

2024-04-30 11:19:28) Info: Next lattice write time is 150000  
 2024-04-30 11:19:29) Info: Time is 7.500000000000000  
 2024-04-30 11:19:29) Info: Lattice write time is 7.500000000000000, in steps is 150000  
 2024-04-30 11:19:29) Info: Next lattice write time is 152000  
 2024-04-30 11:19:30) Info: Time is 7.600000000000000  
 2024-04-30 11:19:30) Info: Lattice write time is 7.600000000000000, in steps is 152000  
 2024-04-30 11:19:30) Info: Next lattice write time is 154000  
 2024-04-30 11:19:31) Info: Time is 7.700000000000000  
 2024-04-30 11:19:31) Info: Lattice write time is 7.700000000000000, in steps is 154000  
 2024-04-30 11:19:31) Info: Next lattice write time is 156000  
 2024-04-30 11:19:32) Info: Time is 7.800000000000000  
 2024-04-30 11:19:32) Info: Lattice write time is 7.800000000000000, in steps is 156000  
 2024-04-30 11:19:32) Info: Next lattice write time is 158000  
 2024-04-30 11:19:33) Info: Time is 7.900000000000000  
 2024-04-30 11:19:33) Info: Lattice write time is 7.900000000000000, in steps is 158000  
 2024-04-30 11:19:33) Info: Next lattice write time is 160000  
 2024-04-30 11:19:33) Info: Time is 8.000000000000000  
 2024-04-30 11:19:33) Info: Lattice write time is 8.000000000000000, in steps is 160000  
 2024-04-30 11:19:33) Info: Next lattice write time is 162000  
 2024-04-30 11:19:34) Info: Time is 8.100000000000000  
 2024-04-30 11:19:34) Info: Lattice write time is 8.100000000000000, in steps is 162000  
 2024-04-30 11:19:34) Info: Next lattice write time is 164000  
 2024-04-30 11:19:35) Info: Time is 8.200000000000000  
 2024-04-30 11:19:35) Info: Lattice write time is 8.200000000000000, in steps is 164000  
 2024-04-30 11:19:35) Info: Next lattice write time is 166000  
 2024-04-30 11:19:36) Info: Time is 8.300000000000000  
 2024-04-30 11:19:36) Info: Lattice write time is 8.300000000000000, in steps is 166000  
 2024-04-30 11:19:36) Info: Next lattice write time is 168000  
 2024-04-30 11:19:37) Info: Time is 8.400000000000000  
 2024-04-30 11:19:37) Info: Lattice write time is 8.400000000000000, in steps is 168000  
 2024-04-30 11:19:37) Info: Next lattice write time is 170000  
 2024-04-30 11:19:38) Info: Time is 8.500000000000000  
 2024-04-30 11:19:38) Info: Lattice write time is 8.500000000000000, in steps is 170000  
 2024-04-30 11:19:38) Info: Next lattice write time is 172000  
 2024-04-30 11:19:39) Info: Time is 8.600000000000000  
 2024-04-30 11:19:39) Info: Lattice write time is 8.600000000000000, in steps is 172000

2024-04-30 11:19:39) Info: Next lattice write time is 174000  
 2024-04-30 11:19:40) Info: Time is 8.700000000000000  
 2024-04-30 11:19:40) Info: Lattice write time is 8.700000000000000, in steps is 174000  
 2024-04-30 11:19:40) Info: Next lattice write time is 176000  
 2024-04-30 11:19:41) Info: Time is 8.800000000000000  
 2024-04-30 11:19:41) Info: Lattice write time is 8.800000000000000, in steps is 176000  
 2024-04-30 11:19:41) Info: Next lattice write time is 178000  
 2024-04-30 11:19:42) Info: Time is 8.900000000000000  
 2024-04-30 11:19:42) Info: Lattice write time is 8.900000000000000, in steps is 178000  
 2024-04-30 11:19:42) Info: Next lattice write time is 180000  
 2024-04-30 11:19:43) Info: Time is 9.000000000000000  
 2024-04-30 11:19:43) Info: Lattice write time is 9.000000000000000, in steps is 180000  
 2024-04-30 11:19:43) Info: Next lattice write time is 182000  
 2024-04-30 11:19:44) Info: Time is 9.100000000000000  
 2024-04-30 11:19:44) Info: Lattice write time is 9.100000000000000, in steps is 182000  
 2024-04-30 11:19:44) Info: Next lattice write time is 184000  
 2024-04-30 11:19:45) Info: Time is 9.200000000000000  
 2024-04-30 11:19:45) Info: Lattice write time is 9.200000000000000, in steps is 184000  
 2024-04-30 11:19:45) Info: Next lattice write time is 186000  
 2024-04-30 11:19:46) Info: Time is 9.300000000000000  
 2024-04-30 11:19:46) Info: Lattice write time is 9.300000000000000, in steps is 186000  
 2024-04-30 11:19:46) Info: Next lattice write time is 188000  
 2024-04-30 11:19:47) Info: Time is 9.400000000000000  
 2024-04-30 11:19:47) Info: Lattice write time is 9.400000000000000, in steps is 188000  
 2024-04-30 11:19:47) Info: Next lattice write time is 190000  
 2024-04-30 11:19:48) Info: Time is 9.500000000000000  
 2024-04-30 11:19:48) Info: Lattice write time is 9.500000000000000, in steps is 190000  
 2024-04-30 11:19:48) Info: Next lattice write time is 192000  
 2024-04-30 11:19:49) Info: Time is 9.600000000000000  
 2024-04-30 11:19:49) Info: Lattice write time is 9.600000000000000, in steps is 192000  
 2024-04-30 11:19:49) Info: Next lattice write time is 194000  
 2024-04-30 11:19:49) Info: Time is 9.700000000000000  
 2024-04-30 11:19:49) Info: Lattice write time is 9.700000000000000, in steps is 194000  
 2024-04-30 11:19:50) Info: Next lattice write time is 196000  
 2024-04-30 11:19:50) Info: Time is 9.800000000000000  
 2024-04-30 11:19:50) Info: Lattice write time is 9.800000000000000, in steps is 196000

2024-04-30 11:19:50) Info: Next lattice write time is 198000  
 2024-04-30 11:19:51) Info: Time is 9.900000000000000  
 2024-04-30 11:19:51) Info: Lattice write time is 9.900000000000000, in steps is 198000  
 2024-04-30 11:19:51) Info: Next lattice write time is 200000  
 2024-04-30 11:19:52) Info: Time is 10.000000000000000  
 2024-04-30 11:19:52) Info: Lattice write time is 10.000000000000000, in steps is 200000  
 2024-04-30 11:19:52) Info: Next lattice write time is 202000  
 2024-04-30 11:19:53) Info: Time is 10.100000000000000  
 2024-04-30 11:19:53) Info: Lattice write time is 10.100000000000000, in steps is 202000  
 2024-04-30 11:19:53) Info: Next lattice write time is 204000  
 2024-04-30 11:19:54) Info: Time is 10.200000000000000  
 2024-04-30 11:19:54) Info: Lattice write time is 10.200000000000000, in steps is 204000  
 2024-04-30 11:19:54) Info: Next lattice write time is 206000  
 2024-04-30 11:19:55) Info: Time is 10.300000000000000  
 2024-04-30 11:19:55) Info: Lattice write time is 10.300000000000000, in steps is 206000  
 2024-04-30 11:19:55) Info: Next lattice write time is 208000  
 2024-04-30 11:19:56) Info: Time is 10.400000000000000  
 2024-04-30 11:19:56) Info: Lattice write time is 10.400000000000000, in steps is 208000  
 2024-04-30 11:19:56) Info: Next lattice write time is 210000  
 2024-04-30 11:19:57) Info: Time is 10.500000000000000  
 2024-04-30 11:19:57) Info: Lattice write time is 10.500000000000000, in steps is 210000  
 2024-04-30 11:19:57) Info: Next lattice write time is 212000  
 2024-04-30 11:19:58) Info: Time is 10.600000000000000  
 2024-04-30 11:19:58) Info: Lattice write time is 10.600000000000000, in steps is 212000  
 2024-04-30 11:19:58) Info: Next lattice write time is 214000  
 2024-04-30 11:19:59) Info: Time is 10.700000000000000  
 2024-04-30 11:19:59) Info: Lattice write time is 10.700000000000000, in steps is 214000  
 2024-04-30 11:19:59) Info: Next lattice write time is 216000  
 2024-04-30 11:20:00) Info: Time is 10.800000000000000  
 2024-04-30 11:20:00) Info: Lattice write time is 10.800000000000000, in steps is 216000  
 2024-04-30 11:20:00) Info: Next lattice write time is 218000  
 2024-04-30 11:20:01) Info: Time is 10.900000000000000  
 2024-04-30 11:20:01) Info: Lattice write time is 10.900000000000000, in steps is 218000  
 2024-04-30 11:20:01) Info: Next lattice write time is 220000  
 2024-04-30 11:20:02) Info: Time is 11.000000000000000  
 2024-04-30 11:20:02) Info: Lattice write time is 11.000000000000000, in steps is 220000

2024-04-30 11:20:02) Info: Next lattice write time is 222000  
 2024-04-30 11:20:03) Info: Time is 11.100000000000000  
 2024-04-30 11:20:03) Info: Lattice write time is 11.100000000000000, in steps is 222000  
 2024-04-30 11:20:03) Info: Next lattice write time is 224000  
 2024-04-30 11:20:04) Info: Time is 11.200000000000000  
 2024-04-30 11:20:04) Info: Lattice write time is 11.200000000000000, in steps is 224000  
 2024-04-30 11:20:04) Info: Next lattice write time is 226000  
 2024-04-30 11:20:05) Info: Time is 11.300000000000000  
 2024-04-30 11:20:05) Info: Lattice write time is 11.300000000000000, in steps is 226000  
 2024-04-30 11:20:05) Info: Next lattice write time is 228000  
 2024-04-30 11:20:06) Info: Time is 11.400000000000000  
 2024-04-30 11:20:06) Info: Lattice write time is 11.400000000000000, in steps is 228000  
 2024-04-30 11:20:06) Info: Next lattice write time is 230000  
 2024-04-30 11:20:07) Info: Time is 11.500000000000000  
 2024-04-30 11:20:07) Info: Lattice write time is 11.500000000000000, in steps is 230000  
 2024-04-30 11:20:07) Info: Next lattice write time is 232000  
 2024-04-30 11:20:08) Info: Time is 11.600000000000000  
 2024-04-30 11:20:08) Info: Lattice write time is 11.600000000000000, in steps is 232000  
 2024-04-30 11:20:08) Info: Next lattice write time is 234000  
 2024-04-30 11:20:09) Info: Time is 11.700000000000000  
 2024-04-30 11:20:09) Info: Lattice write time is 11.700000000000000, in steps is 234000  
 2024-04-30 11:20:09) Info: Next lattice write time is 236000  
 2024-04-30 11:20:10) Info: Time is 11.800000000000000  
 2024-04-30 11:20:10) Info: Lattice write time is 11.800000000000000, in steps is 236000  
 2024-04-30 11:20:10) Info: Next lattice write time is 238000  
 2024-04-30 11:20:11) Info: Time is 11.900000000000000  
 2024-04-30 11:20:11) Info: Lattice write time is 11.900000000000000, in steps is 238000  
 2024-04-30 11:20:11) Info: Next lattice write time is 240000  
 2024-04-30 11:20:12) Info: Time is 12.000000000000000  
 2024-04-30 11:20:12) Info: Lattice write time is 12.000000000000000, in steps is 240000  
 2024-04-30 11:20:12) Info: Next lattice write time is 242000  
 2024-04-30 11:20:13) Info: Time is 12.100000000000000  
 2024-04-30 11:20:13) Info: Lattice write time is 12.100000000000000, in steps is 242000  
 2024-04-30 11:20:13) Info: Next lattice write time is 244000  
 2024-04-30 11:20:14) Info: Time is 12.200000000000000  
 2024-04-30 11:20:14) Info: Lattice write time is 12.200000000000000, in steps is 244000



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2024-04-30 11:20:14) Info: Next lattice write time is 246000
2024-04-30 11:20:15) Info: Time is 12.300000000000000
2024-04-30 11:20:15) Info: Lattice write time is 12.300000000000000, in steps is
246000
2024-04-30 11:20:15) Info: Next lattice write time is 248000
2024-04-30 11:20:16) Info: Time is 12.400000000000000
2024-04-30 11:20:16) Info: Lattice write time is 12.400000000000000, in steps is
248000
2024-04-30 11:20:16) Info: Next lattice write time is 250000
2024-04-30 11:20:17) Info: Time is 12.500000000000000
2024-04-30 11:20:17) Info: Lattice write time is 12.500000000000000, in steps is
250000
2024-04-30 11:20:17) Info: Next lattice write time is 252000
2024-04-30 11:20:18) Info: Average walltime per timestep: 0.48 ms. Progress:
12.5887s/30.0000s ( 42% done / 2.8 minutes walltime remaining)
2024-04-30 11:20:18) Info: Time is 12.600000000000000
2024-04-30 11:20:18) Info: Lattice write time is 12.600000000000000, in steps is
252000
2024-04-30 11:20:18) Info: Next lattice write time is 254000
2024-04-30 11:20:18) Info: Wrote 62 data sets (1040189934 bytes) in the last
60.17 seconds (1.90 seconds writing). 0 datasets queued. Flushing.
2024-04-30 11:20:19) Info: Time is 12.700000000000000
2024-04-30 11:20:19) Info: Lattice write time is 12.700000000000000, in steps is
254000
2024-04-30 11:20:19) Info: Next lattice write time is 256000
2024-04-30 11:20:20) Info: Time is 12.800000000000000
2024-04-30 11:20:20) Info: Lattice write time is 12.800000000000000, in steps is
256000
2024-04-30 11:20:20) Info: Next lattice write time is 258000
2024-04-30 11:20:20) Info: Time is 12.900000000000000
2024-04-30 11:20:20) Info: Lattice write time is 12.900000000000000, in steps is
258000
2024-04-30 11:20:20) Info: Next lattice write time is 260000
2024-04-30 11:20:21) Info: Time is 13.000000000000000
2024-04-30 11:20:21) Info: Lattice write time is 13.000000000000000, in steps is
260000
2024-04-30 11:20:21) Info: Next lattice write time is 262000
2024-04-30 11:20:22) Info: Time is 13.100000000000000
2024-04-30 11:20:22) Info: Lattice write time is 13.100000000000000, in steps is
262000
2024-04-30 11:20:22) Info: Next lattice write time is 264000
2024-04-30 11:20:23) Info: Time is 13.200000000000000
2024-04-30 11:20:23) Info: Lattice write time is 13.200000000000000, in steps is
264000
2024-04-30 11:20:23) Info: Next lattice write time is 266000
2024-04-30 11:20:24) Info: Time is 13.300000000000000
2024-04-30 11:20:24) Info: Lattice write time is 13.300000000000000, in steps is
266000

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2024-04-30 11:20:24) Info: Next lattice write time is 268000  
2024-04-30 11:20:25) Info: Time is 13.400000000000000  
2024-04-30 11:20:25) Info: Lattice write time is 13.400000000000000, in steps is 268000  
2024-04-30 11:20:25) Info: Next lattice write time is 270000  
2024-04-30 11:20:26) Info: Time is 13.500000000000000  
2024-04-30 11:20:26) Info: Lattice write time is 13.500000000000000, in steps is 270000  
2024-04-30 11:20:26) Info: Next lattice write time is 272000  
2024-04-30 11:20:27) Info: Time is 13.600000000000000  
2024-04-30 11:20:27) Info: Lattice write time is 13.600000000000000, in steps is 272000  
2024-04-30 11:20:27) Info: Next lattice write time is 274000  
2024-04-30 11:20:28) Info: Time is 13.700000000000000  
2024-04-30 11:20:28) Info: Lattice write time is 13.700000000000000, in steps is 274000  
2024-04-30 11:20:28) Info: Next lattice write time is 276000  
2024-04-30 11:20:29) Info: Time is 13.800000000000000  
2024-04-30 11:20:29) Info: Lattice write time is 13.800000000000000, in steps is 276000  
2024-04-30 11:20:29) Info: Next lattice write time is 278000  
2024-04-30 11:20:30) Info: Time is 13.900000000000000  
2024-04-30 11:20:30) Info: Lattice write time is 13.900000000000000, in steps is 278000  
2024-04-30 11:20:30) Info: Next lattice write time is 280000  
2024-04-30 11:20:31) Info: Time is 14.000000000000000  
2024-04-30 11:20:31) Info: Lattice write time is 14.000000000000000, in steps is 280000  
2024-04-30 11:20:31) Info: Next lattice write time is 282000  
2024-04-30 11:20:32) Info: Time is 14.100000000000000  
2024-04-30 11:20:32) Info: Lattice write time is 14.100000000000000, in steps is 282000  
2024-04-30 11:20:32) Info: Next lattice write time is 284000  
2024-04-30 11:20:33) Info: Time is 14.200000000000000  
2024-04-30 11:20:33) Info: Lattice write time is 14.200000000000000, in steps is 284000  
2024-04-30 11:20:33) Info: Next lattice write time is 286000  
2024-04-30 11:20:34) Info: Time is 14.300000000000000  
2024-04-30 11:20:34) Info: Lattice write time is 14.300000000000000, in steps is 286000  
2024-04-30 11:20:34) Info: Next lattice write time is 288000  
2024-04-30 11:20:35) Info: Time is 14.400000000000000  
2024-04-30 11:20:35) Info: Lattice write time is 14.400000000000000, in steps is 288000  
2024-04-30 11:20:35) Info: Next lattice write time is 290000  
2024-04-30 11:20:36) Info: Time is 14.500000000000000  
2024-04-30 11:20:36) Info: Lattice write time is 14.500000000000000, in steps is 290000

2024-04-30 11:20:36) Info: Next lattice write time is 292000  
 2024-04-30 11:20:36) Info: Time is 14.600000000000000  
 2024-04-30 11:20:36) Info: Lattice write time is 14.600000000000000, in steps is 292000  
 2024-04-30 11:20:36) Info: Next lattice write time is 294000  
 2024-04-30 11:20:37) Info: Time is 14.700000000000000  
 2024-04-30 11:20:37) Info: Lattice write time is 14.700000000000000, in steps is 294000  
 2024-04-30 11:20:37) Info: Next lattice write time is 296000  
 2024-04-30 11:20:38) Info: Time is 14.800000000000000  
 2024-04-30 11:20:38) Info: Lattice write time is 14.800000000000000, in steps is 296000  
 2024-04-30 11:20:38) Info: Next lattice write time is 298000  
 2024-04-30 11:20:39) Info: Time is 14.900000000000000  
 2024-04-30 11:20:39) Info: Lattice write time is 14.900000000000000, in steps is 298000  
 2024-04-30 11:20:39) Info: Next lattice write time is 300000  
 2024-04-30 11:20:40) Info: Time is 15.000000000000000  
 2024-04-30 11:20:40) Info: Lattice write time is 15.000000000000000, in steps is 300000  
 2024-04-30 11:20:40) Info: Next lattice write time is 302000  
 2024-04-30 11:20:41) Info: Time is 15.100000000000000  
 2024-04-30 11:20:41) Info: Lattice write time is 15.100000000000000, in steps is 302000  
 2024-04-30 11:20:41) Info: Next lattice write time is 304000  
 2024-04-30 11:20:42) Info: Time is 15.200000000000000  
 2024-04-30 11:20:42) Info: Lattice write time is 15.200000000000000, in steps is 304000  
 2024-04-30 11:20:42) Info: Next lattice write time is 306000  
 2024-04-30 11:20:43) Info: Time is 15.300000000000000  
 2024-04-30 11:20:43) Info: Lattice write time is 15.300000000000000, in steps is 306000  
 2024-04-30 11:20:43) Info: Next lattice write time is 308000  
 2024-04-30 11:20:44) Info: Time is 15.400000000000000  
 2024-04-30 11:20:44) Info: Lattice write time is 15.400000000000000, in steps is 308000  
 2024-04-30 11:20:44) Info: Next lattice write time is 310000  
 2024-04-30 11:20:45) Info: Time is 15.500000000000000  
 2024-04-30 11:20:45) Info: Lattice write time is 15.500000000000000, in steps is 310000  
 2024-04-30 11:20:45) Info: Next lattice write time is 312000  
 2024-04-30 11:20:46) Info: Time is 15.600000000000000  
 2024-04-30 11:20:46) Info: Lattice write time is 15.600000000000000, in steps is 312000  
 2024-04-30 11:20:46) Info: Next lattice write time is 314000  
 2024-04-30 11:20:47) Info: Time is 15.700000000000000  
 2024-04-30 11:20:47) Info: Lattice write time is 15.700000000000000, in steps is 314000

2024-04-30 11:20:47) Info: Next lattice write time is 316000  
 2024-04-30 11:20:48) Info: Time is 15.800000000000000  
 2024-04-30 11:20:48) Info: Lattice write time is 15.800000000000000, in steps is 316000  
 2024-04-30 11:20:48) Info: Next lattice write time is 318000  
 2024-04-30 11:20:49) Info: Time is 15.900000000000000  
 2024-04-30 11:20:49) Info: Lattice write time is 15.900000000000000, in steps is 318000  
 2024-04-30 11:20:49) Info: Next lattice write time is 320000  
 2024-04-30 11:20:50) Info: Time is 16.000000000000000  
 2024-04-30 11:20:50) Info: Lattice write time is 16.000000000000000, in steps is 320000  
 2024-04-30 11:20:50) Info: Next lattice write time is 322000  
 2024-04-30 11:20:51) Info: Time is 16.100000000000000  
 2024-04-30 11:20:51) Info: Lattice write time is 16.100000000000000, in steps is 322000  
 2024-04-30 11:20:51) Info: Next lattice write time is 324000  
 2024-04-30 11:20:52) Info: Time is 16.200000000000000  
 2024-04-30 11:20:52) Info: Lattice write time is 16.200000000000000, in steps is 324000  
 2024-04-30 11:20:52) Info: Next lattice write time is 326000  
 2024-04-30 11:20:53) Info: Time is 16.300000000000000  
 2024-04-30 11:20:53) Info: Lattice write time is 16.300000000000000, in steps is 326000  
 2024-04-30 11:20:53) Info: Next lattice write time is 328000  
 2024-04-30 11:20:54) Info: Time is 16.400000000000000  
 2024-04-30 11:20:54) Info: Lattice write time is 16.400000000000000, in steps is 328000  
 2024-04-30 11:20:54) Info: Next lattice write time is 330000  
 2024-04-30 11:20:55) Info: Time is 16.500000000000000  
 2024-04-30 11:20:55) Info: Lattice write time is 16.500000000000000, in steps is 330000  
 2024-04-30 11:20:55) Info: Next lattice write time is 332000  
 2024-04-30 11:20:56) Info: Time is 16.600000000000000  
 2024-04-30 11:20:56) Info: Lattice write time is 16.600000000000000, in steps is 332000  
 2024-04-30 11:20:56) Info: Next lattice write time is 334000  
 2024-04-30 11:20:57) Info: Time is 16.700000000000000  
 2024-04-30 11:20:57) Info: Lattice write time is 16.700000000000000, in steps is 334000  
 2024-04-30 11:20:57) Info: Next lattice write time is 336000  
 2024-04-30 11:20:57) Info: Time is 16.800000000000000  
 2024-04-30 11:20:57) Info: Lattice write time is 16.800000000000000, in steps is 336000  
 2024-04-30 11:20:57) Info: Next lattice write time is 338000  
 2024-04-30 11:20:58) Info: Time is 16.900000000000000  
 2024-04-30 11:20:58) Info: Lattice write time is 16.900000000000000, in steps is 338000

2024-04-30 11:20:58) Info: Next lattice write time is 340000  
 2024-04-30 11:20:59) Info: Time is 17.000000000000000  
 2024-04-30 11:20:59) Info: Lattice write time is 17.000000000000000, in steps is 340000  
 2024-04-30 11:20:59) Info: Next lattice write time is 342000  
 2024-04-30 11:21:00) Info: Time is 17.100000000000000  
 2024-04-30 11:21:00) Info: Lattice write time is 17.100000000000000, in steps is 342000  
 2024-04-30 11:21:00) Info: Next lattice write time is 344000  
 2024-04-30 11:21:01) Info: Time is 17.200000000000000  
 2024-04-30 11:21:01) Info: Lattice write time is 17.200000000000000, in steps is 344000  
 2024-04-30 11:21:01) Info: Next lattice write time is 346000  
 2024-04-30 11:21:02) Info: Time is 17.300000000000000  
 2024-04-30 11:21:02) Info: Lattice write time is 17.300000000000000, in steps is 346000  
 2024-04-30 11:21:02) Info: Next lattice write time is 348000  
 2024-04-30 11:21:03) Info: Time is 17.400000000000000  
 2024-04-30 11:21:03) Info: Lattice write time is 17.400000000000000, in steps is 348000  
 2024-04-30 11:21:03) Info: Next lattice write time is 350000  
 2024-04-30 11:21:04) Info: Time is 17.500000000000000  
 2024-04-30 11:21:04) Info: Lattice write time is 17.500000000000000, in steps is 350000  
 2024-04-30 11:21:04) Info: Next lattice write time is 352000  
 2024-04-30 11:21:05) Info: Time is 17.600000000000000  
 2024-04-30 11:21:05) Info: Lattice write time is 17.600000000000000, in steps is 352000  
 2024-04-30 11:21:05) Info: Next lattice write time is 354000  
 2024-04-30 11:21:06) Info: Time is 17.700000000000000  
 2024-04-30 11:21:06) Info: Lattice write time is 17.700000000000000, in steps is 354000  
 2024-04-30 11:21:06) Info: Next lattice write time is 356000  
 2024-04-30 11:21:07) Info: Time is 17.800000000000000  
 2024-04-30 11:21:07) Info: Lattice write time is 17.800000000000000, in steps is 356000  
 2024-04-30 11:21:07) Info: Next lattice write time is 358000  
 2024-04-30 11:21:08) Info: Time is 17.900000000000000  
 2024-04-30 11:21:08) Info: Lattice write time is 17.900000000000000, in steps is 358000  
 2024-04-30 11:21:08) Info: Next lattice write time is 360000  
 2024-04-30 11:21:09) Info: Time is 18.000000000000000  
 2024-04-30 11:21:09) Info: Lattice write time is 18.000000000000000, in steps is 360000  
 2024-04-30 11:21:09) Info: Next lattice write time is 362000  
 2024-04-30 11:21:10) Info: Time is 18.100000000000000  
 2024-04-30 11:21:10) Info: Lattice write time is 18.100000000000000, in steps is 362000

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2024-04-30 11:21:10) Info: Next lattice write time is 364000
2024-04-30 11:21:11) Info: Time is 18.200000000000000
2024-04-30 11:21:11) Info: Lattice write time is 18.200000000000000, in steps is
364000
2024-04-30 11:21:11) Info: Next lattice write time is 366000
2024-04-30 11:21:12) Info: Time is 18.300000000000000
2024-04-30 11:21:12) Info: Lattice write time is 18.300000000000000, in steps is
366000
2024-04-30 11:21:12) Info: Next lattice write time is 368000
2024-04-30 11:21:13) Info: Time is 18.400000000000000
2024-04-30 11:21:13) Info: Lattice write time is 18.400000000000000, in steps is
368000
2024-04-30 11:21:13) Info: Next lattice write time is 370000
2024-04-30 11:21:14) Info: Time is 18.500000000000000
2024-04-30 11:21:14) Info: Lattice write time is 18.500000000000000, in steps is
370000
2024-04-30 11:21:14) Info: Next lattice write time is 372000
2024-04-30 11:21:15) Info: Time is 18.600000000000000
2024-04-30 11:21:15) Info: Lattice write time is 18.600000000000000, in steps is
372000
2024-04-30 11:21:15) Info: Next lattice write time is 374000
2024-04-30 11:21:16) Info: Time is 18.700000000000000
2024-04-30 11:21:16) Info: Lattice write time is 18.700000000000000, in steps is
374000
2024-04-30 11:21:16) Info: Next lattice write time is 376000
2024-04-30 11:21:17) Info: Time is 18.800000000000000
2024-04-30 11:21:17) Info: Lattice write time is 18.800000000000000, in steps is
376000
2024-04-30 11:21:17) Info: Next lattice write time is 378000
2024-04-30 11:21:18) Info: Average walltime per timestep: 0.48 ms. Progress:
18.8833s/30.0000s ( 62.9% done / 1.8 minutes walltime remaining)
2024-04-30 11:21:18) Info: Time is 18.900000000000000
2024-04-30 11:21:18) Info: Lattice write time is 18.900000000000000, in steps is
378000
2024-04-30 11:21:18) Info: Next lattice write time is 380000
2024-04-30 11:21:18) Info: Wrote 63 data sets (1056967191 bytes) in the last
60.06 seconds (1.96 seconds writing). 0 datasets queued. Flushing.
2024-04-30 11:21:19) Info: Time is 19.000000000000000
2024-04-30 11:21:19) Info: Lattice write time is 19.000000000000000, in steps is
380000
2024-04-30 11:21:19) Info: Next lattice write time is 382000
2024-04-30 11:21:20) Info: Time is 19.100000000000000
2024-04-30 11:21:20) Info: Lattice write time is 19.100000000000000, in steps is
382000
2024-04-30 11:21:20) Info: Next lattice write time is 384000
2024-04-30 11:21:21) Info: Time is 19.200000000000000
2024-04-30 11:21:21) Info: Lattice write time is 19.200000000000000, in steps is
384000

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2024-04-30 11:21:21) Info: Next lattice write time is 386000  
 2024-04-30 11:21:22) Info: Time is 19.300000000000000  
 2024-04-30 11:21:22) Info: Lattice write time is 19.300000000000000, in steps is 386000  
 2024-04-30 11:21:22) Info: Next lattice write time is 388000  
 2024-04-30 11:21:22) Info: Time is 19.400000000000000  
 2024-04-30 11:21:22) Info: Lattice write time is 19.400000000000000, in steps is 388000  
 2024-04-30 11:21:22) Info: Next lattice write time is 390000  
 2024-04-30 11:21:23) Info: Time is 19.500000000000000  
 2024-04-30 11:21:23) Info: Lattice write time is 19.500000000000000, in steps is 390000  
 2024-04-30 11:21:23) Info: Next lattice write time is 392000  
 2024-04-30 11:21:24) Info: Time is 19.600000000000000  
 2024-04-30 11:21:24) Info: Lattice write time is 19.600000000000000, in steps is 392000  
 2024-04-30 11:21:25) Info: Next lattice write time is 394000  
 2024-04-30 11:21:26) Info: Time is 19.700000000000000  
 2024-04-30 11:21:26) Info: Lattice write time is 19.700000000000000, in steps is 394000  
 2024-04-30 11:21:26) Info: Next lattice write time is 396000  
 2024-04-30 11:21:27) Info: Time is 19.800000000000000  
 2024-04-30 11:21:27) Info: Lattice write time is 19.800000000000000, in steps is 396000  
 2024-04-30 11:21:27) Info: Next lattice write time is 398000  
 2024-04-30 11:21:28) Info: Time is 19.900000000000000  
 2024-04-30 11:21:28) Info: Lattice write time is 19.900000000000000, in steps is 398000  
 2024-04-30 11:21:28) Info: Next lattice write time is 400000  
 2024-04-30 11:21:29) Info: Time is 20.000000000000000  
 2024-04-30 11:21:29) Info: Lattice write time is 20.000000000000000, in steps is 400000  
 2024-04-30 11:21:29) Info: Next lattice write time is 402000  
 2024-04-30 11:21:30) Info: Time is 20.100000000000000  
 2024-04-30 11:21:30) Info: Lattice write time is 20.100000000000000, in steps is 402000  
 2024-04-30 11:21:30) Info: Next lattice write time is 404000  
 2024-04-30 11:21:31) Info: Time is 20.200000000000000  
 2024-04-30 11:21:31) Info: Lattice write time is 20.200000000000000, in steps is 404000  
 2024-04-30 11:21:31) Info: Next lattice write time is 406000  
 2024-04-30 11:21:32) Info: Time is 20.300000000000000  
 2024-04-30 11:21:32) Info: Lattice write time is 20.300000000000000, in steps is 406000  
 2024-04-30 11:21:32) Info: Next lattice write time is 408000  
 2024-04-30 11:21:33) Info: Time is 20.400000000000000  
 2024-04-30 11:21:33) Info: Lattice write time is 20.400000000000000, in steps is 408000

2024-04-30 11:21:33) Info: Next lattice write time is 410000  
2024-04-30 11:21:34) Info: Time is 20.500000000000000  
2024-04-30 11:21:34) Info: Lattice write time is 20.500000000000000, in steps is 410000  
2024-04-30 11:21:34) Info: Next lattice write time is 412000  
2024-04-30 11:21:35) Info: Time is 20.600000000000000  
2024-04-30 11:21:35) Info: Lattice write time is 20.600000000000000, in steps is 412000  
2024-04-30 11:21:35) Info: Next lattice write time is 414000  
2024-04-30 11:21:36) Info: Time is 20.700000000000000  
2024-04-30 11:21:36) Info: Lattice write time is 20.700000000000000, in steps is 414000  
2024-04-30 11:21:36) Info: Next lattice write time is 416000  
2024-04-30 11:21:37) Info: Time is 20.800000000000000  
2024-04-30 11:21:37) Info: Lattice write time is 20.800000000000000, in steps is 416000  
2024-04-30 11:21:37) Info: Next lattice write time is 418000  
2024-04-30 11:21:38) Info: Time is 20.900000000000000  
2024-04-30 11:21:38) Info: Lattice write time is 20.900000000000000, in steps is 418000  
2024-04-30 11:21:38) Info: Next lattice write time is 420000  
2024-04-30 11:21:39) Info: Time is 21.000000000000000  
2024-04-30 11:21:39) Info: Lattice write time is 21.000000000000000, in steps is 420000  
2024-04-30 11:21:39) Info: Next lattice write time is 422000  
2024-04-30 11:21:40) Info: Time is 21.100000000000000  
2024-04-30 11:21:40) Info: Lattice write time is 21.100000000000000, in steps is 422000  
2024-04-30 11:21:40) Info: Next lattice write time is 424000  
2024-04-30 11:21:41) Info: Time is 21.200000000000000  
2024-04-30 11:21:41) Info: Lattice write time is 21.200000000000000, in steps is 424000  
2024-04-30 11:21:41) Info: Next lattice write time is 426000  
2024-04-30 11:21:42) Info: Time is 21.300000000000000  
2024-04-30 11:21:42) Info: Lattice write time is 21.300000000000000, in steps is 426000  
2024-04-30 11:21:42) Info: Next lattice write time is 428000  
2024-04-30 11:21:43) Info: Time is 21.400000000000000  
2024-04-30 11:21:43) Info: Lattice write time is 21.400000000000000, in steps is 428000  
2024-04-30 11:21:43) Info: Next lattice write time is 430000  
2024-04-30 11:21:44) Info: Time is 21.500000000000000  
2024-04-30 11:21:44) Info: Lattice write time is 21.500000000000000, in steps is 430000  
2024-04-30 11:21:44) Info: Next lattice write time is 432000  
2024-04-30 11:21:45) Info: Time is 21.600000000000000  
2024-04-30 11:21:45) Info: Lattice write time is 21.600000000000000, in steps is 432000



2024-04-30 11:21:45) Info: Next lattice write time is 434000  
 2024-04-30 11:21:46) Info: Time is 21.700000000000000  
 2024-04-30 11:21:46) Info: Lattice write time is 21.700000000000000, in steps is 434000  
 2024-04-30 11:21:46) Info: Next lattice write time is 436000  
 2024-04-30 11:21:47) Info: Time is 21.800000000000000  
 2024-04-30 11:21:47) Info: Lattice write time is 21.800000000000000, in steps is 436000  
 2024-04-30 11:21:47) Info: Next lattice write time is 438000  
 2024-04-30 11:21:48) Info: Time is 21.900000000000000  
 2024-04-30 11:21:48) Info: Lattice write time is 21.900000000000000, in steps is 438000  
 2024-04-30 11:21:48) Info: Next lattice write time is 440000  
 2024-04-30 11:21:49) Info: Time is 22.000000000000000  
 2024-04-30 11:21:49) Info: Lattice write time is 22.000000000000000, in steps is 440000  
 2024-04-30 11:21:49) Info: Next lattice write time is 442000  
 2024-04-30 11:21:50) Info: Time is 22.100000000000000  
 2024-04-30 11:21:50) Info: Lattice write time is 22.100000000000000, in steps is 442000  
 2024-04-30 11:21:50) Info: Next lattice write time is 444000  
 2024-04-30 11:21:51) Info: Time is 22.200000000000000  
 2024-04-30 11:21:51) Info: Lattice write time is 22.200000000000000, in steps is 444000  
 2024-04-30 11:21:51) Info: Next lattice write time is 446000  
 2024-04-30 11:21:52) Info: Time is 22.300000000000000  
 2024-04-30 11:21:52) Info: Lattice write time is 22.300000000000000, in steps is 446000  
 2024-04-30 11:21:52) Info: Next lattice write time is 448000  
 2024-04-30 11:21:53) Info: Time is 22.400000000000000  
 2024-04-30 11:21:53) Info: Lattice write time is 22.400000000000000, in steps is 448000  
 2024-04-30 11:21:53) Info: Next lattice write time is 450000  
 2024-04-30 11:21:54) Info: Time is 22.500000000000000  
 2024-04-30 11:21:54) Info: Lattice write time is 22.500000000000000, in steps is 450000  
 2024-04-30 11:21:54) Info: Next lattice write time is 452000  
 2024-04-30 11:21:55) Info: Time is 22.600000000000000  
 2024-04-30 11:21:55) Info: Lattice write time is 22.600000000000000, in steps is 452000  
 2024-04-30 11:21:55) Info: Next lattice write time is 454000  
 2024-04-30 11:21:56) Info: Time is 22.700000000000000  
 2024-04-30 11:21:56) Info: Lattice write time is 22.700000000000000, in steps is 454000  
 2024-04-30 11:21:56) Info: Next lattice write time is 456000  
 2024-04-30 11:21:57) Info: Time is 22.800000000000000  
 2024-04-30 11:21:57) Info: Lattice write time is 22.800000000000000, in steps is 456000

2024-04-30 11:21:57) Info: Next lattice write time is 458000  
 2024-04-30 11:21:58) Info: Time is 22.900000000000000  
 2024-04-30 11:21:58) Info: Lattice write time is 22.900000000000000, in steps is 458000  
 2024-04-30 11:21:58) Info: Next lattice write time is 460000  
 2024-04-30 11:21:59) Info: Time is 23.000000000000000  
 2024-04-30 11:21:59) Info: Lattice write time is 23.000000000000000, in steps is 460000  
 2024-04-30 11:21:59) Info: Next lattice write time is 462000  
 2024-04-30 11:22:00) Info: Time is 23.100000000000000  
 2024-04-30 11:22:00) Info: Lattice write time is 23.100000000000000, in steps is 462000  
 2024-04-30 11:22:00) Info: Next lattice write time is 464000  
 2024-04-30 11:22:01) Info: Time is 23.200000000000000  
 2024-04-30 11:22:01) Info: Lattice write time is 23.200000000000000, in steps is 464000  
 2024-04-30 11:22:01) Info: Next lattice write time is 466000  
 2024-04-30 11:22:02) Info: Time is 23.300000000000000  
 2024-04-30 11:22:02) Info: Lattice write time is 23.300000000000000, in steps is 466000  
 2024-04-30 11:22:02) Info: Next lattice write time is 468000  
 2024-04-30 11:22:03) Info: Time is 23.400000000000000  
 2024-04-30 11:22:03) Info: Lattice write time is 23.400000000000000, in steps is 468000  
 2024-04-30 11:22:03) Info: Next lattice write time is 470000  
 2024-04-30 11:22:04) Info: Time is 23.500000000000000  
 2024-04-30 11:22:04) Info: Lattice write time is 23.500000000000000, in steps is 470000  
 2024-04-30 11:22:04) Info: Next lattice write time is 472000  
 2024-04-30 11:22:05) Info: Time is 23.600000000000000  
 2024-04-30 11:22:05) Info: Lattice write time is 23.600000000000000, in steps is 472000  
 2024-04-30 11:22:05) Info: Next lattice write time is 474000  
 2024-04-30 11:22:06) Info: Time is 23.700000000000000  
 2024-04-30 11:22:06) Info: Lattice write time is 23.700000000000000, in steps is 474000  
 2024-04-30 11:22:06) Info: Next lattice write time is 476000  
 2024-04-30 11:22:07) Info: Time is 23.800000000000000  
 2024-04-30 11:22:07) Info: Lattice write time is 23.800000000000000, in steps is 476000  
 2024-04-30 11:22:07) Info: Next lattice write time is 478000  
 2024-04-30 11:22:08) Info: Time is 23.900000000000000  
 2024-04-30 11:22:08) Info: Lattice write time is 23.900000000000000, in steps is 478000  
 2024-04-30 11:22:08) Info: Next lattice write time is 480000  
 2024-04-30 11:22:09) Info: Time is 24.000000000000000  
 2024-04-30 11:22:09) Info: Lattice write time is 24.000000000000000, in steps is 480000

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2024-04-30 11:22:09) Info: Next lattice write time is 482000
2024-04-30 11:22:10) Info: Time is 24.100000000000000
2024-04-30 11:22:10) Info: Lattice write time is 24.100000000000000, in steps is
482000
2024-04-30 11:22:10) Info: Next lattice write time is 484000
2024-04-30 11:22:11) Info: Time is 24.200000000000000
2024-04-30 11:22:11) Info: Lattice write time is 24.200000000000000, in steps is
484000
2024-04-30 11:22:11) Info: Next lattice write time is 486000
2024-04-30 11:22:12) Info: Time is 24.300000000000000
2024-04-30 11:22:12) Info: Lattice write time is 24.300000000000000, in steps is
486000
2024-04-30 11:22:12) Info: Next lattice write time is 488000
2024-04-30 11:22:13) Info: Time is 24.400000000000000
2024-04-30 11:22:13) Info: Lattice write time is 24.400000000000000, in steps is
488000
2024-04-30 11:22:13) Info: Next lattice write time is 490000
2024-04-30 11:22:14) Info: Time is 24.500000000000000
2024-04-30 11:22:14) Info: Lattice write time is 24.500000000000000, in steps is
490000
2024-04-30 11:22:14) Info: Next lattice write time is 492000
2024-04-30 11:22:15) Info: Time is 24.600000000000000
2024-04-30 11:22:15) Info: Lattice write time is 24.600000000000000, in steps is
492000
2024-04-30 11:22:15) Info: Next lattice write time is 494000
2024-04-30 11:22:16) Info: Time is 24.700000000000000
2024-04-30 11:22:16) Info: Lattice write time is 24.700000000000000, in steps is
494000
2024-04-30 11:22:16) Info: Next lattice write time is 496000
2024-04-30 11:22:17) Info: Time is 24.800000000000000
2024-04-30 11:22:17) Info: Lattice write time is 24.800000000000000, in steps is
496000
2024-04-30 11:22:17) Info: Next lattice write time is 498000
2024-04-30 11:22:18) Info: Average walltime per timestep: 0.50 ms. Progress:
24.8356s/30.0000s ( 82.8% done / 52 seconds walltime remaining)
2024-04-30 11:22:18) Info: Time is 24.900000000000000
2024-04-30 11:22:18) Info: Lattice write time is 24.900000000000000, in steps is
498000
2024-04-30 11:22:18) Info: Next lattice write time is 500000
2024-04-30 11:22:18) Info: Wrote 60 data sets (1006635420 bytes) in the last
60.50 seconds (1.86 seconds writing). 0 datasets queued. Flushing.
2024-04-30 11:22:19) Info: Time is 25.000000000000000
2024-04-30 11:22:19) Info: Lattice write time is 25.000000000000000, in steps is
500000
2024-04-30 11:22:19) Info: Next lattice write time is 502000
2024-04-30 11:22:20) Info: Time is 25.100000000000000
2024-04-30 11:22:20) Info: Lattice write time is 25.100000000000000, in steps is
502000

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2024-04-30 11:22:20) Info: Next lattice write time is 504000  
2024-04-30 11:22:21) Info: Time is 25.200000000000000  
2024-04-30 11:22:21) Info: Lattice write time is 25.200000000000000, in steps is 504000  
2024-04-30 11:22:21) Info: Next lattice write time is 506000  
2024-04-30 11:22:22) Info: Time is 25.300000000000000  
2024-04-30 11:22:22) Info: Lattice write time is 25.300000000000000, in steps is 506000  
2024-04-30 11:22:22) Info: Next lattice write time is 508000  
2024-04-30 11:22:23) Info: Time is 25.400000000000000  
2024-04-30 11:22:23) Info: Lattice write time is 25.400000000000000, in steps is 508000  
2024-04-30 11:22:23) Info: Next lattice write time is 510000  
2024-04-30 11:22:24) Info: Time is 25.500000000000000  
2024-04-30 11:22:24) Info: Lattice write time is 25.500000000000000, in steps is 510000  
2024-04-30 11:22:24) Info: Next lattice write time is 512000  
2024-04-30 11:22:25) Info: Time is 25.600000000000000  
2024-04-30 11:22:25) Info: Lattice write time is 25.600000000000000, in steps is 512000  
2024-04-30 11:22:25) Info: Next lattice write time is 514000  
2024-04-30 11:22:26) Info: Time is 25.700000000000000  
2024-04-30 11:22:26) Info: Lattice write time is 25.700000000000000, in steps is 514000  
2024-04-30 11:22:26) Info: Next lattice write time is 516000  
2024-04-30 11:22:27) Info: Time is 25.800000000000000  
2024-04-30 11:22:27) Info: Lattice write time is 25.800000000000000, in steps is 516000  
2024-04-30 11:22:27) Info: Next lattice write time is 518000  
2024-04-30 11:22:28) Info: Time is 25.900000000000000  
2024-04-30 11:22:28) Info: Lattice write time is 25.900000000000000, in steps is 518000  
2024-04-30 11:22:28) Info: Next lattice write time is 520000  
2024-04-30 11:22:29) Info: Time is 26.000000000000000  
2024-04-30 11:22:29) Info: Lattice write time is 26.000000000000000, in steps is 520000  
2024-04-30 11:22:29) Info: Next lattice write time is 522000  
2024-04-30 11:22:30) Info: Time is 26.100000000000000  
2024-04-30 11:22:30) Info: Lattice write time is 26.100000000000000, in steps is 522000  
2024-04-30 11:22:30) Info: Next lattice write time is 524000  
2024-04-30 11:22:31) Info: Time is 26.200000000000000  
2024-04-30 11:22:31) Info: Lattice write time is 26.200000000000000, in steps is 524000  
2024-04-30 11:22:31) Info: Next lattice write time is 526000  
2024-04-30 11:22:32) Info: Time is 26.300000000000000  
2024-04-30 11:22:32) Info: Lattice write time is 26.300000000000000, in steps is 526000

2024-04-30 11:22:32) Info: Next lattice write time is 528000  
 2024-04-30 11:22:33) Info: Time is 26.400000000000000  
 2024-04-30 11:22:33) Info: Lattice write time is 26.400000000000000, in steps is 528000  
 2024-04-30 11:22:33) Info: Next lattice write time is 530000  
 2024-04-30 11:22:35) Info: Time is 26.500000000000000  
 2024-04-30 11:22:35) Info: Lattice write time is 26.500000000000000, in steps is 530000  
 2024-04-30 11:22:35) Info: Next lattice write time is 532000  
 2024-04-30 11:22:36) Info: Time is 26.600000000000000  
 2024-04-30 11:22:36) Info: Lattice write time is 26.600000000000000, in steps is 532000  
 2024-04-30 11:22:36) Info: Next lattice write time is 534000  
 2024-04-30 11:22:37) Info: Time is 26.700000000000000  
 2024-04-30 11:22:37) Info: Lattice write time is 26.700000000000000, in steps is 534000  
 2024-04-30 11:22:37) Info: Next lattice write time is 536000  
 2024-04-30 11:22:38) Info: Time is 26.800000000000000  
 2024-04-30 11:22:38) Info: Lattice write time is 26.800000000000000, in steps is 536000  
 2024-04-30 11:22:38) Info: Next lattice write time is 538000  
 2024-04-30 11:22:39) Info: Time is 26.900000000000000  
 2024-04-30 11:22:39) Info: Lattice write time is 26.900000000000000, in steps is 538000  
 2024-04-30 11:22:39) Info: Next lattice write time is 540000  
 2024-04-30 11:22:40) Info: Time is 27.000000000000000  
 2024-04-30 11:22:40) Info: Lattice write time is 27.000000000000000, in steps is 540000  
 2024-04-30 11:22:40) Info: Next lattice write time is 542000  
 2024-04-30 11:22:41) Info: Time is 27.100000000000000  
 2024-04-30 11:22:41) Info: Lattice write time is 27.100000000000000, in steps is 542000  
 2024-04-30 11:22:41) Info: Next lattice write time is 544000  
 2024-04-30 11:22:42) Info: Time is 27.200000000000000  
 2024-04-30 11:22:42) Info: Lattice write time is 27.200000000000000, in steps is 544000  
 2024-04-30 11:22:42) Info: Next lattice write time is 546000  
 2024-04-30 11:22:43) Info: Time is 27.300000000000000  
 2024-04-30 11:22:43) Info: Lattice write time is 27.300000000000000, in steps is 546000  
 2024-04-30 11:22:43) Info: Next lattice write time is 548000  
 2024-04-30 11:22:44) Info: Time is 27.400000000000000  
 2024-04-30 11:22:44) Info: Lattice write time is 27.400000000000000, in steps is 548000  
 2024-04-30 11:22:44) Info: Next lattice write time is 550000  
 2024-04-30 11:22:45) Info: Time is 27.500000000000000  
 2024-04-30 11:22:45) Info: Lattice write time is 27.500000000000000, in steps is 550000

2024-04-30 11:22:45) Info: Next lattice write time is 552000  
 2024-04-30 11:22:46) Info: Time is 27.600000000000000  
 2024-04-30 11:22:46) Info: Lattice write time is 27.600000000000000, in steps is 552000  
 2024-04-30 11:22:46) Info: Next lattice write time is 554000  
 2024-04-30 11:22:47) Info: Time is 27.700000000000000  
 2024-04-30 11:22:47) Info: Lattice write time is 27.700000000000000, in steps is 554000  
 2024-04-30 11:22:47) Info: Next lattice write time is 556000  
 2024-04-30 11:22:48) Info: Time is 27.800000000000000  
 2024-04-30 11:22:48) Info: Lattice write time is 27.800000000000000, in steps is 556000  
 2024-04-30 11:22:48) Info: Next lattice write time is 558000  
 2024-04-30 11:22:49) Info: Time is 27.900000000000000  
 2024-04-30 11:22:49) Info: Lattice write time is 27.900000000000000, in steps is 558000  
 2024-04-30 11:22:49) Info: Next lattice write time is 560000  
 2024-04-30 11:22:50) Info: Time is 28.000000000000000  
 2024-04-30 11:22:50) Info: Lattice write time is 28.000000000000000, in steps is 560000  
 2024-04-30 11:22:50) Info: Next lattice write time is 562000  
 2024-04-30 11:22:51) Info: Time is 28.100000000000000  
 2024-04-30 11:22:51) Info: Lattice write time is 28.100000000000000, in steps is 562000  
 2024-04-30 11:22:51) Info: Next lattice write time is 564000  
 2024-04-30 11:22:52) Info: Time is 28.200000000000000  
 2024-04-30 11:22:52) Info: Lattice write time is 28.200000000000000, in steps is 564000  
 2024-04-30 11:22:52) Info: Next lattice write time is 566000  
 2024-04-30 11:22:53) Info: Time is 28.300000000000000  
 2024-04-30 11:22:53) Info: Lattice write time is 28.300000000000000, in steps is 566000  
 2024-04-30 11:22:53) Info: Next lattice write time is 568000  
 2024-04-30 11:22:54) Info: Time is 28.400000000000000  
 2024-04-30 11:22:54) Info: Lattice write time is 28.400000000000000, in steps is 568000  
 2024-04-30 11:22:54) Info: Next lattice write time is 570000  
 2024-04-30 11:22:55) Info: Time is 28.500000000000000  
 2024-04-30 11:22:55) Info: Lattice write time is 28.500000000000000, in steps is 570000  
 2024-04-30 11:22:55) Info: Next lattice write time is 572000  
 2024-04-30 11:22:56) Info: Time is 28.600000000000000  
 2024-04-30 11:22:56) Info: Lattice write time is 28.600000000000000, in steps is 572000  
 2024-04-30 11:22:56) Info: Next lattice write time is 574000  
 2024-04-30 11:22:57) Info: Time is 28.700000000000000  
 2024-04-30 11:22:57) Info: Lattice write time is 28.700000000000000, in steps is 574000

2024-04-30 11:22:57) Info: Next lattice write time is 576000  
 2024-04-30 11:22:58) Info: Time is 28.800000000000000  
 2024-04-30 11:22:58) Info: Lattice write time is 28.800000000000000, in steps is 576000  
 2024-04-30 11:22:58) Info: Next lattice write time is 578000  
 2024-04-30 11:22:59) Info: Time is 28.900000000000000  
 2024-04-30 11:22:59) Info: Lattice write time is 28.900000000000000, in steps is 578000  
 2024-04-30 11:22:59) Info: Next lattice write time is 580000  
 2024-04-30 11:23:00) Info: Time is 29.000000000000000  
 2024-04-30 11:23:00) Info: Lattice write time is 29.000000000000000, in steps is 580000  
 2024-04-30 11:23:00) Info: Next lattice write time is 582000  
 2024-04-30 11:23:01) Info: Time is 29.100000000000000  
 2024-04-30 11:23:01) Info: Lattice write time is 29.100000000000000, in steps is 582000  
 2024-04-30 11:23:01) Info: Next lattice write time is 584000  
 2024-04-30 11:23:02) Info: Time is 29.200000000000000  
 2024-04-30 11:23:02) Info: Lattice write time is 29.200000000000000, in steps is 584000  
 2024-04-30 11:23:02) Info: Next lattice write time is 586000  
 2024-04-30 11:23:03) Info: Time is 29.300000000000000  
 2024-04-30 11:23:03) Info: Lattice write time is 29.300000000000000, in steps is 586000  
 2024-04-30 11:23:03) Info: Next lattice write time is 588000  
 2024-04-30 11:23:04) Info: Time is 29.400000000000000  
 2024-04-30 11:23:04) Info: Lattice write time is 29.400000000000000, in steps is 588000  
 2024-04-30 11:23:04) Info: Next lattice write time is 590000  
 2024-04-30 11:23:05) Info: Time is 29.500000000000000  
 2024-04-30 11:23:05) Info: Lattice write time is 29.500000000000000, in steps is 590000  
 2024-04-30 11:23:05) Info: Next lattice write time is 592000  
 2024-04-30 11:23:06) Info: Time is 29.600000000000000  
 2024-04-30 11:23:06) Info: Lattice write time is 29.600000000000000, in steps is 592000  
 2024-04-30 11:23:06) Info: Next lattice write time is 594000  
 2024-04-30 11:23:07) Info: Time is 29.700000000000000  
 2024-04-30 11:23:07) Info: Lattice write time is 29.700000000000000, in steps is 594000  
 2024-04-30 11:23:07) Info: Next lattice write time is 596000  
 2024-04-30 11:23:08) Info: Time is 29.800000000000000  
 2024-04-30 11:23:08) Info: Lattice write time is 29.800000000000000, in steps is 596000  
 2024-04-30 11:23:08) Info: Next lattice write time is 598000  
 2024-04-30 11:23:09) Info: Time is 29.900000000000000  
 2024-04-30 11:23:09) Info: Lattice write time is 29.900000000000000, in steps is 598000

```

2024-04-30 11:23:09) Info: Next lattice write time is 600000
2024-04-30 11:23:10) Info: Time is 30.000000000000000
2024-04-30 11:23:10) Info: Lattice write time is 30.000000000000000, in steps is
600000
2024-04-30 11:23:10) Info: Next lattice write time is 602000
2024-04-30 11:23:10) Info: Data output thread finished.
2024-04-30 11:23:10) Info: Simulation file closed.

```

```
[27]: <jLM.RDME.File at 0x7f261756d5c0>
```

## 5 4. Analysis

The trajectory will be saved as h5 format, we need the python package `h5py` to access it, or you can download the [HDFView](#) to see it in a GUI.

```
[28]: import matplotlib.pyplot as plt
import h5py
import seaborn as sns
from jLM.RDME import File as RDMEFile
```

```
[29]: # traj_file = h5py.File('T1_bimolecular.lm ', 'r')
traj = RDMEFile(filename)
ts, As = traj.getNumberTrajectory(species="A")
ts, Bs = traj.getNumberTrajectory(species="B")
ts, Cs = traj.getNumberTrajectory(species="C")
```

```
[33]: # now visuzlize the trajectories with seaborn and plt
sns.set(style="whitegrid")
# Create a color palette
palette = sns.color_palette()
plt.figure(figsize=(10,6))
plt.plot(ts, As, label='A',marker='o', linestyle='-',color=palette[0])
plt.plot(ts, Bs, label='B',marker='x', linestyle='--',color=palette[1])
plt.plot(ts, Cs, label='C',color=palette[2])

plt.title('Trajectories of Biomolecular System uniform distribution')
plt.xlabel('Time (s)')
plt.ylabel('Counts')
plt.legend()
plt.savefig('./images/TutR1.1_bimolecular_uni.png')
plt.show()
```



