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Langevin Meeting

April 11, 2023

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Problem: Upwards Trend of the Emittance

- Potential Causes
  - Timestepping might not be conserving (tested with synchronous Leapfrog scheme / Velocity Verlet) ☑
  - Check γ-factor ☑
  - Macro-particle number is the same as simulated particles ☑
  - Split constant focusing for Leapfrog ☑
  - Maybe the simulated domain is too small (running with 512^3 currently running into OOM issues) ☐
  - Check Correlation Matrix with analytical values of Normally Distributed particles in the sphere ☐
- Furthermore
  - Merged the two dumping functions into `129-langevin-collision_refactored`

P3M Timestepping (Synchronous Leapfrog)

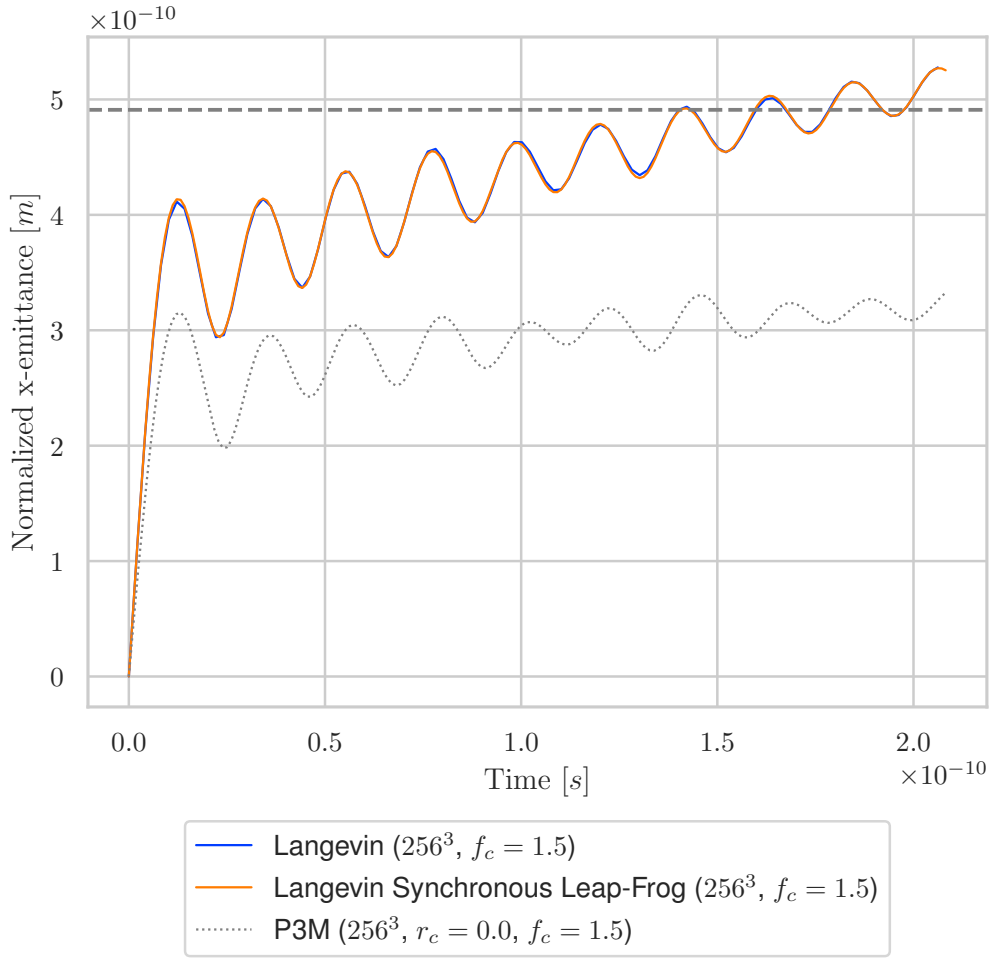

Figure 1: Synchronous Leapfrog.

Gamma Factor

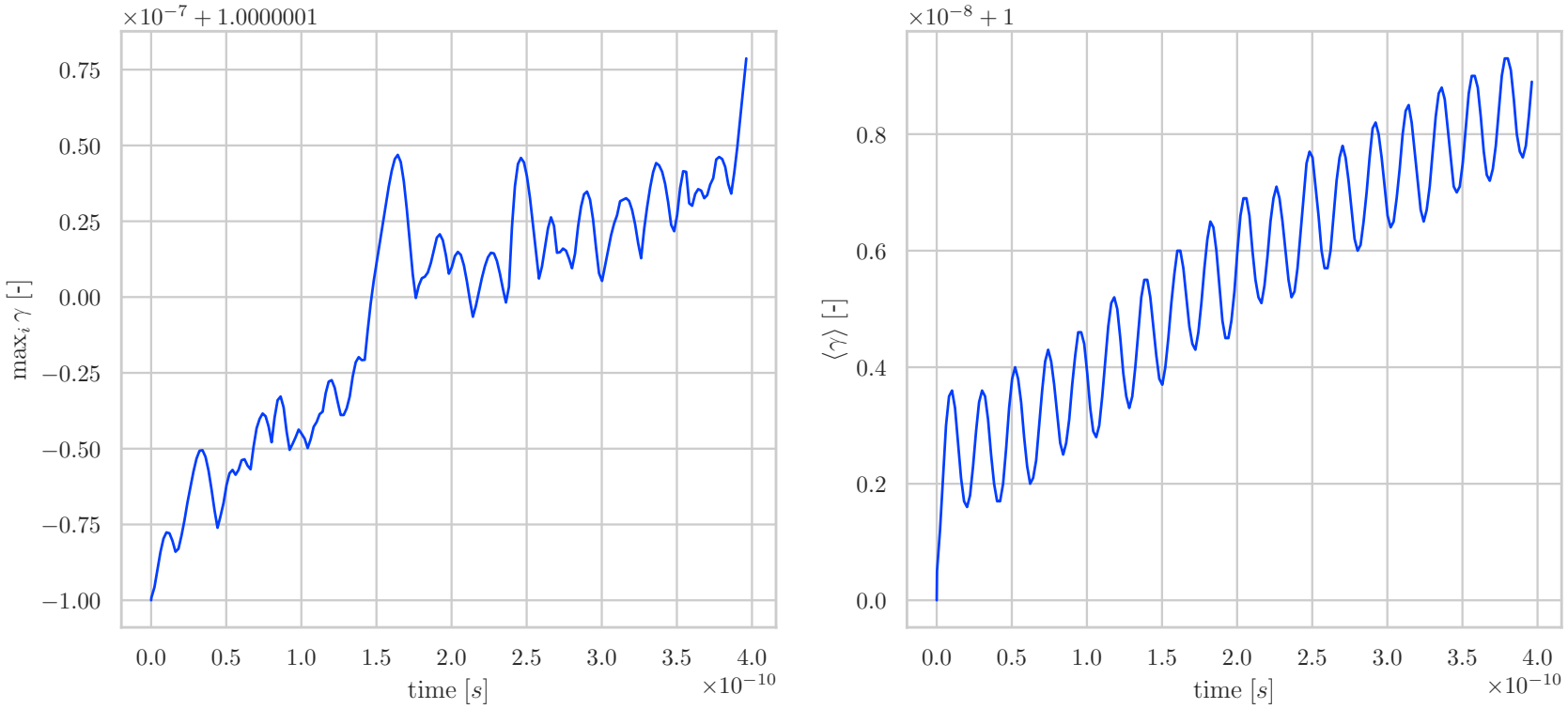

Figure 2: Gamma Factor Check. It is equal to 1 as expected.

Increased Focusing

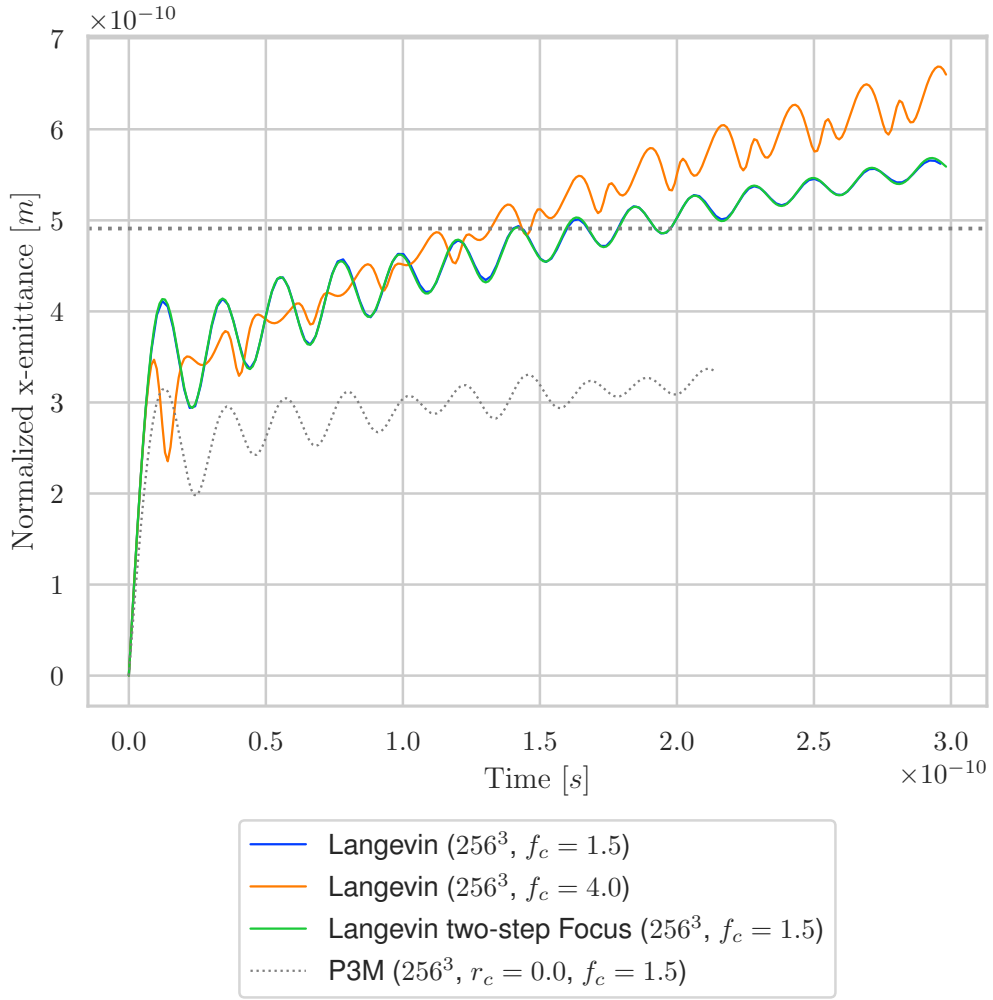

Figure 3: Increased Focusing Strength causes expected periodic behaviour to break down.

Code Snippets

```
template<Dim D, typename T, class Callable>
inline T centered_stencil(const T &hInv,
                          const Callable &F,
                          size_type i, j, k){
    return 0.5 * hInv * (- shiftedIdxApply<D>(F,-1,i,j,k) +
                           shiftedIdxApply<D>(F,1,i,j,k));
}

enum Dim {X, Y, Z};
DiffType DiffX = Centered;

DiffOpChain<Dim::X,DiffX,
            DiffOpChain<Dim::X,DiffX,FView_t> > diff_xx(
                    FView_t F, Vector_t hInv
                    );

// Call it on an index
std::cout << diff_xx(42,42,42) << std::endl;
```