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IPPL Meeting

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Hessian Operator

- Old implementation chose operators at compile-time via `constexpr` return statement
- Doesn't allow for loop through index ranges of $\partial\Omega$
- Potential solution, use `std::variant` to store them in container; discouraged by Alex

Current Idea:

- Decouple stencils from operators themselves
- Instantiate 1D stencils (pass them to Hessian operator) at runtime for each index range

Diffusion Coefficient: At Gridcells

1. Matrix entries exhibits magnitudes in range $[10^{14}, 10^{19}]$

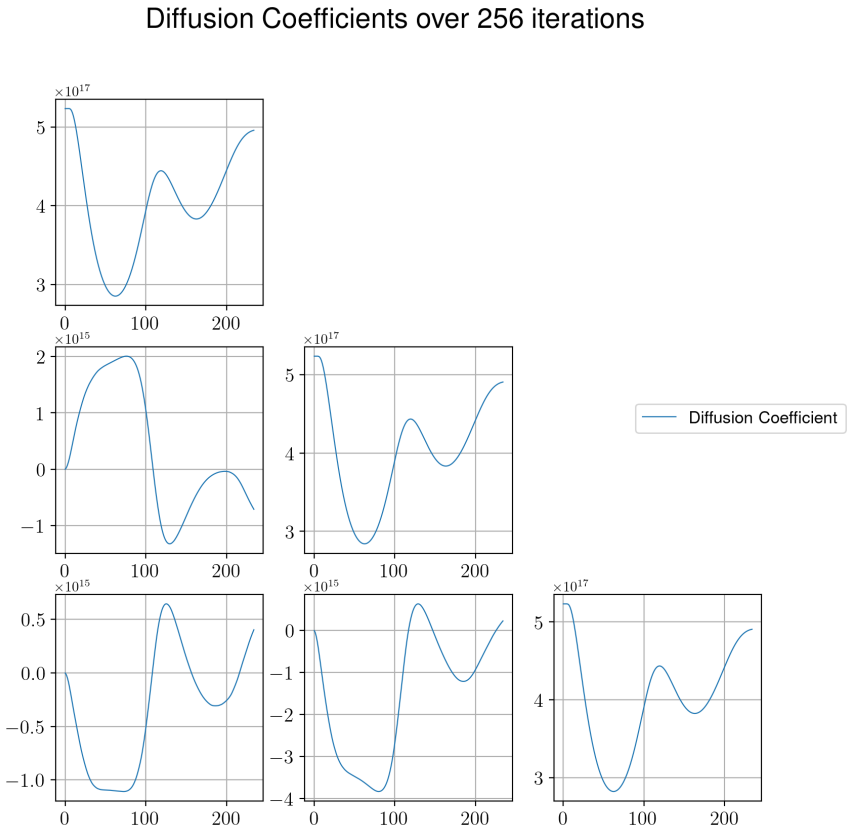

Figure 1: Value average over time.

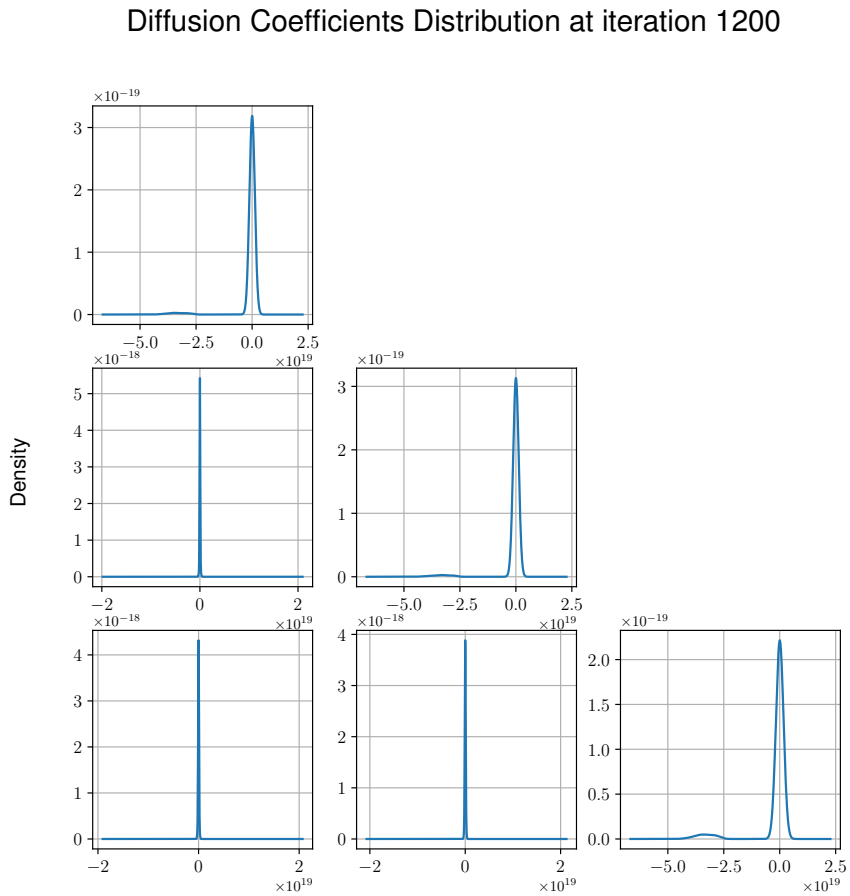

Figure 2: Distribution of the values at the last iteration

Cholesky Decomposed D : At Particles

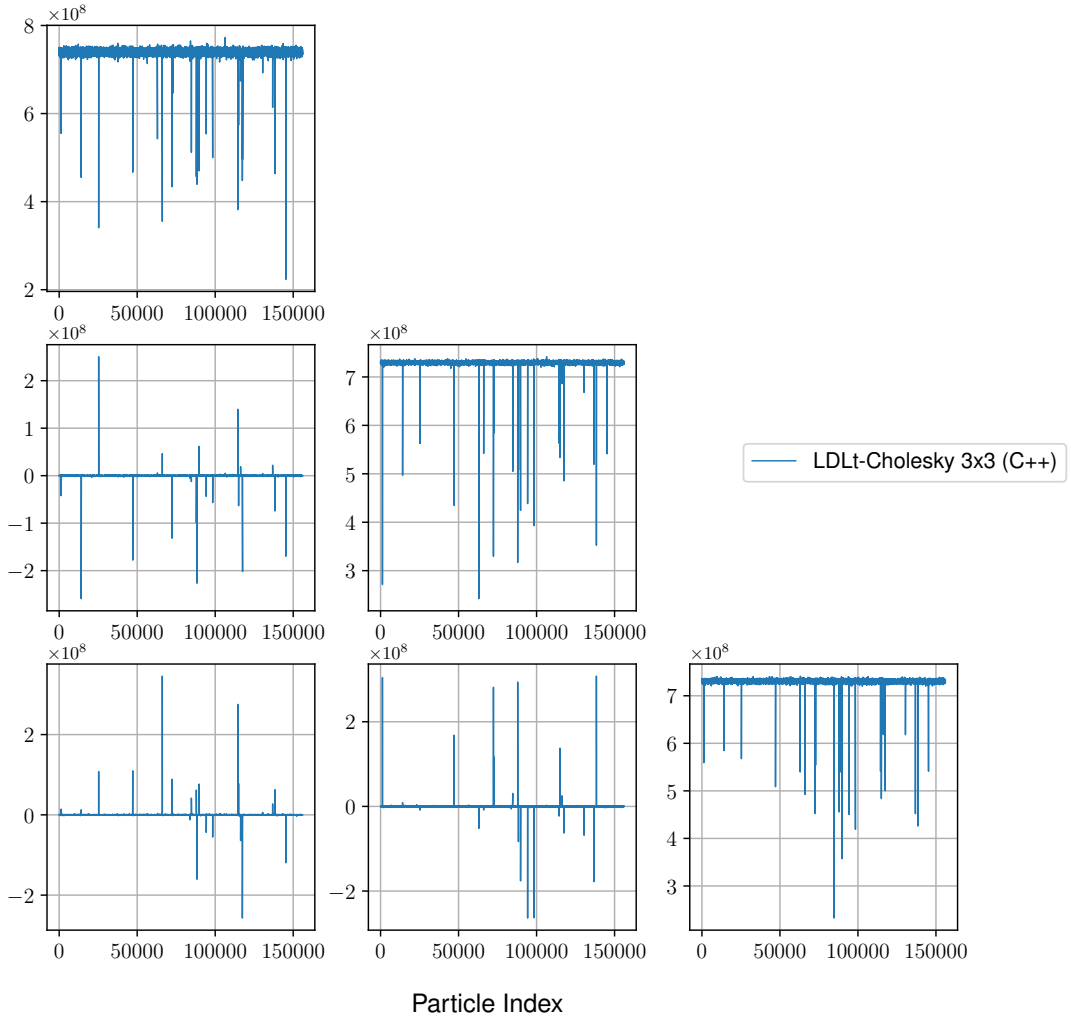

Figure 3: Potential numerical instabilities in current Cholesky Algorithm.

(Adjusted) Timeline

Date	Target Goals
16/05	Setup v-space datastructures in `LangevinParticles.hpp`. Add Friction coefficient. Add Solver for 2nd Rosenbluth potential $g(\vec{v})$.
23/05	Analyse structure of $\boldsymbol{D}$. Finish Diffusion coefficient computation (via onesided Hessian operator).
30/05	Analyse interplay between collision coeff.'s (see whether Severin's conclusions are confirmed or can be disproved).
	Profiling of runtime and memory consumption.
06/06	Start improving most pressing bottlenecks. Start writing.
17/07	Submission.

Table 1: Timeline with approximate milestones