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1 Closing remarks

This work initially aimed to explore what Kokkos offers for writing portable code. During the project, we successfully implemented several variants of the **P2P inner** kernel, achieving interesting performance results. However, while the **hierarchical version** was expected to outperform the flat versions, this was not exactly the case. Further investigation is therefore needed to develop a more effective **hierarchical** approach. Moving forward, the goal is now to extend the work done for the basic electrostatic kernel to more generic kernels, allowing us to handle a wider range of interactions, such as:

$$k(x, y) = \frac{(x - y)}{\|x - y\|^3},$$

$$k(x, y) = \ln \{ \|x - y\| \},$$

$$k(x, y) = \exp \left\{ \frac{-\|x - y\|}{\sigma^2} \right\},$$

$$k(x, y) = 3 \frac{(x - y) \otimes (x - y)}{\|x - y\|^5} - \frac{1}{\|x - y\|} \mathbf{I}_{3 \times 3}.$$

Such work would actually provide an opportunity to explore the different possibilities offered by Kokkos views. Additionally, it's worth noting that we only tested Kokkos SIMD with a basic kernel that used common operations, and it performed comparably to state-of-the-art libraries like xsimd. It would be worthwhile to repeat these experiments with more complex kernels (involving functions like logarithmic or exponential operations, which lack pre-implemented SIMD intrinsics) to better assess the extent of support compared to other leading SIMD libraries. A future goal, as it was originally planned, would be to integrate Kokkos-based kernels into a program that uses StarPU to explore how these components can be effectively combined.

2 References