

Accelerating Block-Tridiagonal Matrix Inversion on the GPUs

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Block tridiagonal matrices often arise in quantum physics. For example, the non-equilibrium Greens function involves repeated inversions of large blocks of tridiagonal matrices. Hence, given that those specific types of matrices are in the integral part of the mentioned algorithm and that they may also be of a large dimension, enhancement in the speed of the inversion algorithm of block tridiagonal matrices will have a significant value. The goal of this project is to research on and design strategies to parallelize the inversion algorithm described in Skelboe¹ using CUDA on NVIDIA GPUs. A preliminary experiment shows a speed up to 10x for block tridiagonal matrices of moderate size.

¹ Skelboe, Stig. "The Scheduling of a Parallel Tiled Matrix Inversion Algorithm." (2010).