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IMPLEMENTATION ON GPU OF A SOLVER FOR THE SCHRÖDINGER–POISSON BLOCK IN CONFINED DEVICES

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The Boltzmann–Schrödinger–Poisson model is an accurate description of confined Double Gate MOSFETs, but in exchange of its accuracy it is computationally costly. The goal of this work is to describe an efficient implementation of a solver for this model on heterogeneous CPU-GPU platforms, where all the intense computational phases are performed on GPU (Graphics Processing Units) by using the CUDA (Compute Unified Device Architecture) framework.

The solver has to be thought as consisting of two distinct parts: the transport of electrons along the device, taken into account by a set of Boltzmann equations, and the computation of the advection field, taken into account by the Schrödinger–Poisson block.

In the germ work [1] the authors described how to port the Boltzmann computational block to GPU, but left the port of the Schrödinger–Poisson block to GPU for future work. In the present work, they fill this gap and describe the strategies used for an efficient CUDA implementation of this section.

REFERENCES

[1] Mantas JM and Vecil F (2019) *Hybrid CUDA-OpenMP parallel implementation of a deterministic solver for ultra-shortDG MOSFETs:*, International Journal of High Performance Computing Applications 34 (1) 81–102.