Implementation on a high-performance computing platform of a deterministic solver for Double-Gate MOSFETs

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The Double-Gate MOSFET is a widespread transistor type. Its evolution has witnessed a constant downscaling, from the 10000 nm of the Seventies to the 14 nm of nowaday's smallest MOSFET on the market. Downscaling is important for both better performances and saving of silicon and energy. We simulate a 10 nm device using a hybrid, deterministic, high-dimensional model, so as to fulfill two main goals: being a benchmark for the accuracy other faster but coarser solvers (hydrodynamic, Monte-Carlo, SHE); providing reliable information on zones with a weak amount of charge, something that Monte-Carlo-based simulations cannot do. As a sequential, one-core simulation takes about one month, a parallelization on the graphic card is being realized. We shall show the results obtained until now and a comparison to Monte-Carlo [1, 2].

Keywords: MOSFET device, Boltzmann equation, Schrödinger equation, dimensional coupling, GPU.
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