Realistic simulation of a Double Gate MOSFET through a hybrid quantum-classical model

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A Double Gate MOSFET is described through a hybrid model: electrons are waves along the direction confined by two silicon oxide layers, while they are free to move along the other directions. Their state as waves is identified by a series of 1D stationary-state Schrödinger equations, whose eigenvalues are the decomposition into sub-bands, or energy levels. The Schrödinger equations are coupled to a Poisson equation to take into account the electrostatic field. Along the unconfined dimensions, reduced to one for symmetry reasons, the electrons are transported through Boltzmann Transport Equations, one for each sub-band. The silicon band-structure presents six minima, reduced to three for symmetry reasons, around which the electron populations are distributed. In our model the three valleys are taken non-parabolic for a realistic simulation. As for the transport/collision part, we take into account seven scattering phenomena. Some results are shown.