Current-Voltage Characteristics of Quantum Hydrodynamic Model for Semiconductors

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Abstract: We consider the steady-state isothermal quantum hydrodynamic model for semiconductors. The one-dimensional equations for the electron density and the electron current density are coupled self-consistently to the Poisson's equation for the electrostatic potential. Physically motivated Dirichlet and Neumann boundary conditions for the electron density are prescribed. Numerical scheme for the model is derived and the discrete scheme is solved by using the Newton's iteration. The convergence of the iterative scheme is studied. Numerical simulations for the one-dimensional isothermal quantum hydrodynamic model for semiconductors of a $n^+ - n - n^+$ structure are presented.

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