

Transport in Semiconductors at Saturated Velocities

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A model for the transport of electrons in a semiconductor is considered, where the electrons travel with saturation speed in the direction of the driving force computed self consistently from the POISSON equation. Since the velocity is discontinuous at zeroes of the driving force, an interpretation of the model in the distributional sense is not necessarily possible. For a spatially one-dimensional model existence of distributional solutions is shown by passing to the limit in a regularized problem corresponding to a scaled drift-diffusion model with a velocity saturation assumption on the mobility. Several explicit solutions of the limiting problem will be presented and illustrated by the results of numerical computations. A model for the transport of electrons in a semiconductor is considered, where the electrons travel with saturation speed in the direction of the driving force computed self consistently from the POISSON equation. Since the velocity is discontinuous at zeroes of the driving force, an interpretation of the model in the distributional sense is not necessarily possible. For a spatially one-dimensional model existence of distributional solutions is shown by passing to the limit in a regularized problem corresponding to a scaled drift-diffusion model with a velocity saturation assumption on the mobility. Several explicit solutions of the limiting problem will be presented and illustrated by the results of numerical computations. This is a joint work with JAN HASKOVEC (Charles University Prague).