Solution of the Wigner-Poisson Equations for RTDs

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ABSTRACT

We will discuss a parametric study of the solution of the Wigner-Poisson equations for resonant tunneling diodes. These structures exhibit self-sustaining oscillations in certain operating regimes. We show numerically that the phenomenon corresponds to a Hopf bifurcation, using the bias across the device as a continuation parameter. We will describe the engineering consequences of our study and how it is a significant advance from some previous work, which used much coarser grids. We use the LOCA package from Sandia National Laboratory. This package, and the underlying NOX and Trilinos software, enables effective parallelization. We report on the scalability of our implementation.

Keywords: Wigner-Poisson Equations, Resonant Tunneling Diode, Hopf Bifurcation, Continuation.

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