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Transient response of a quantum point contact due to the coupling with reservoirs[1] BOZIDAR NOVAKOVIC, IRENA KNEZEVIC, University of Wisconsin-Madison — Transient response is important for better understanding of the DC and AC response of open quantum systems connected to large charge reservoirs. In this study we calculate the transient response of a quantum point contact (QPC) due to its coupling with reservoirs. The QPC, an open system, is modeled by a solution to the coupled, two-dimensional Schrödinger and Poisson equations using a discrete subset of the normal modes basis. The normal modes are projected onto the traveling-wave solutions that match the incoming reservoir plane waves. The occupation of the open system states carries the information about the time evolution and is calculated by solving a coarse- grained quantum master equation with suitably defined open system/contact interaction Hamiltonians. The final electronic transient response is obtained by enforcing the current continuity across the open system/contacts boundaries through a time-dependent reservoir drift wavevector. We investigate the transient current response to a voltage step and its dependence on the gate bias and relaxation time in the contacts.

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