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Transient effects in electron transport through quantum dots

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Abstract

We investigate the transient electron transport through the quantum dot and double quantum dot systems coupled with the time-dependent barriers to infinitely large reservoirs of noninteracting electrons. Time-dependent currents and quantum dot occupancies are calculated using both nonequilibrium Green's functions formalism and the equation of motion method for appropriate correlation functions. We show that the sequence of ultrafast modulation of the tunneling amplitudes between the electron reservoirs and the quantum dots can induce quite different electron occupation of the quantum dot in comparison with the static case. We also find that the oscillations of the transient current following the sudden coupling of the electron reservoirs with the double quantum dot system have the same frequency as Rabi's oscillations of the double dot state vector.



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