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Equilibrium technique applied to strongly correlated electron transport in steady-state nonequilibrium[1] JONG HAN, State University of New York at Buffalo — We present a quantum algorithm of nonequilibrium steady-state transport within the equilibrium formalism. Current-carrying nonequilibrium ensemble is constructed by the Boltzmann factor $\exp[-\beta(\hat{H}-\hat{Y})]$ using the bias operator $\hat{Y}$ which imposes the boundary condition of different chemical potentials in source-drain reservoirs of electronic device. In the limit of non-interacting quantum dot systems, the mapping of a nonequilibrium to an effective equilibrium system can be explicitly shown to reproduce the Landauer-Büttiker formula. The equilibrium formulation is successfully applied to the strongly correlated transport of the Kondo regime, with the anomalous Kondo peak at small voltage bias and incoherent inelastic transport at high bias. This demonstrates that the numerical tools developed in equilibrium theory, such as quantum Monte Carlo, exact diagonalization, or renormalization group methods, can be applied in nonequilibrium and complement the existing theories based on nonequilibrium Greens function technique.

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