Non-equilibrium properties of a Mott insulator in an external electric field

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A dynamical mean-field theory formalism is developed to exactly solve the non-equilibrium properties of the conduction electrons in the Falicov-Kimball model. We study the response of the conduction electrons on a hypercubic lattice in the half-filled case when an external spatially uniform time-dependent electric field is applied. The single-particle response functions and the electric conductivity are calculated as functions of time for different cases of the time-dependent electric field and for different values of the on-site repulsion parameter U. In particular, the most interesting case occurs when U is close to the Mott-insulator transition value.