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Quantum transport Green function method based on generalized Fourier transform. (Chinese. English summary) Zbl 07448794

Summary: Based on the generalized Fourier transformation, a clear explanation for the Green function method in quantum transport is given. We explain clearly the mathematical theory and physical meaning of the advanced Green function and retarded Green function at equilibrium state. The definition of self-energy by Green function is rigorously derived. The exact boundary condition for the time-dependent Schrödinger equation is designed by the generalized Fourier transform and the framework of converting the open boundary quantum system into the finite boundary problem is presented by introducing the self-energy.

MSC:
65M80 Fundamental solutions, Green’s function methods, etc. for initial value and initial-boundary value problems involving PDEs
82C10 Quantum dynamics and nonequilibrium statistical mechanics (general)
82C70 Transport processes in time-dependent statistical mechanics

Keywords:
generalized Fourier transformation; Schrödinger equation; Green function; self-energy