

Invariant Hermitian Operator and Density Operator for the Adiabatically Time-Dependent System

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Abstract: The density operator is approximately expressed as a function of the invariant Hermitian operator for the adiabatically time-dependent system. Using this method, the calculation of the density operator for the Heisenberg spin system in a weakly time-dependent magnetic field is exemplified. By virtue of the density operator, we obtain the approximate energy expectation value $\langle \hat{H} \rangle$ and spin expectation value $\langle \hat{S} \rangle$ of this system starting from the thermal equilibrium.

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Key words: invariant Hermitian operator, density operator, adiabatically time-dependent system, Heisenberg spin system

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