Loschmidt echo and dynamical fidelity in periodically driven quantum system

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概要

We study the dynamical fidelity and the Loschmidt echo, following a periodic driving of the transverse magnetic field of a quantum Ising chain (across the quantum critical point) which is calculated through the overlap between the initial ground state and the state reached after $n$ periods (calculated using the Floquet theory). We show that the logarithm of the fidelity per-site reaches a steady value in the asymptotic limit of $n$, and we derive an exact analytical expression for this quantity. Remarkably, unlike thermodynamic quantities such as energy and transverse magnetization, the steady state value of logarithm of the fidelity per-site cannot be derived by using a decohered density matrix, and keeps memory of non-trivial phase information.