

Schwinger Method and Path Integral with Generalized Canonical Transformation for a Harmonic Oscillator with Time-Dependent Mass and Frequency

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Abstract: The exact propagator for a harmonic oscillator with time-dependent mass and frequency is found by the Schwinger method and a path integral with a generalized canonical transformation. In the Schwinger formalism, the propagator can be obtained by basic operator algebra and elementary integrations. In the path integral method, it can be shown that such a propagator can be derived from that for a unit mass and frequency oscillator in a new space-time coordinate system with the help of a generalized canonical transformation. The power of propagator methods for solving time-dependent Hamiltonian systems is also discussed.

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