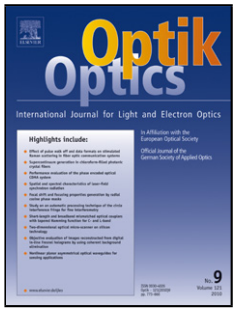

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Fast state transfer in closed quantum system based on the improved bang-bang control

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Fast control of the state of quantum system is one of the robust control problems that often appear in practice, which is effective for decoherence suppression caused by the environment. In this paper, on the basis of an analysis of the advantages and disadvantages of the existing Lyapunov control, we propose three improved bang-bang control designs that are composed of the theory of bang-bang control and parameters optimization method and can solve fast control of the state transfer problem for quantum systems. Numerical simulation shows the effectiveness of the method for the problem of a closed two-level quantum system. Not only the decrease of Lyapunov function is fastened, the optimization of control time is realized and the coherence is protected, but also the high-frequency oscillation that occurs in bang-bang control is effectively avoided.

Keywords: optimal bang-bang control; fast state transfer; quantum system

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